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MAY 1944

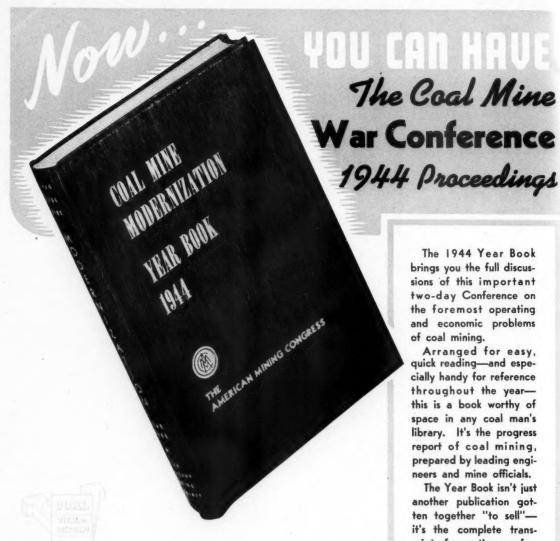


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### MINING CONGRESS JOURNAL

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FRONT COVER- Detroit Edison Dock in the Detroit River.

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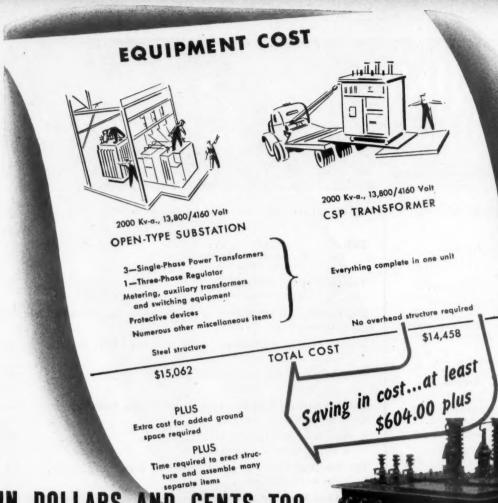
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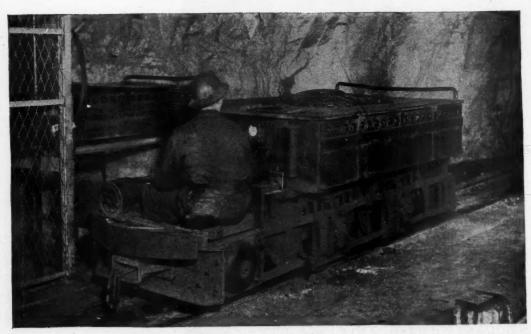
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Typical 1000-hp, 2200-volk, wound-rate Induction motor for mino-hoist drive Every week 192,000: G-E employees purchase more than a million dollars' worth of War Bonds.

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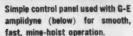


A new 2000-hp hoist driven by two 1000-hp, geared, d-c motors which will raise 38,000 pounds of ore at the rate of 2000 feet per minute. The motor-generator set supplying power to these motors is controlled by a G-E amplidyne, giving "pursuit-ship" acceleration response without a complex contactor setup. (Below) Hoist directly driven by a G-E motor which was recently modernized to increase capacity by the use of amplidyne control.



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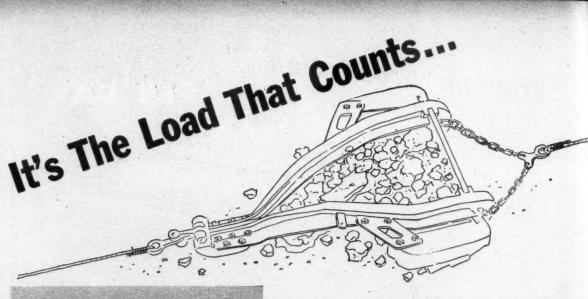
The traditional long-life, dependability, and ease of maintenance of Exide-Ironclads is a guarantee of economy and efficiency. The fact that more mine operators use Exides than all other batteries combined, is proof in itself. For when you buy an Exide-Ironclad, you Buy to Last. Take care of it and Save to Win. Remember, only Exide makes an Ironclad.

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Gardner-Denver Model HK—a powerful single-drum holst. Weighs 440 paynds and can handle a 2000-paund vertical lift 130 feet per minute at 80 paynds of pressure.



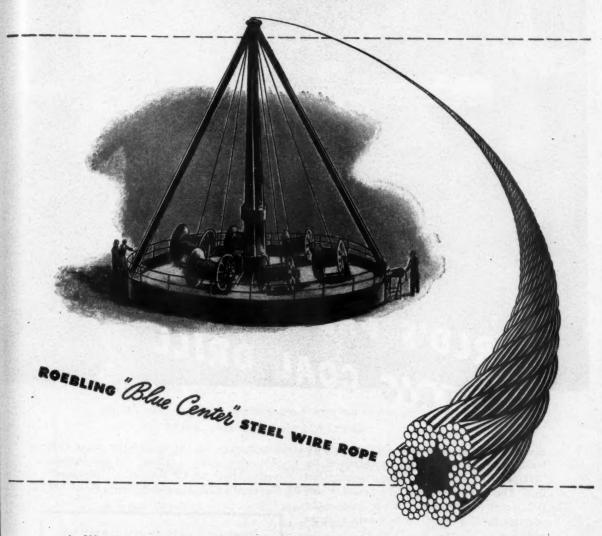
Gerdner-Denver Model HB—a single-drum hots; weighing 250 pounds. At 80 pounds air pressure, this hoist develops a 1250pound rope pull at 62 foot per minute. THERE's only one reason why Gardner-Denver "HBD" lightweight Double-Drum Slushing Hoists rate so high with mining men. These hoists pull a bigger load—faster. They develop high speed in either direction for a quick load and a quick return. And they keep on doing their job dependably, month after month, year after year. Here are some of the features of Gardner-Denver design which make them so popular:

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For complete information on Gardner-Denver hoists, write Gardner-Denver Company, Quincy, Illinois.

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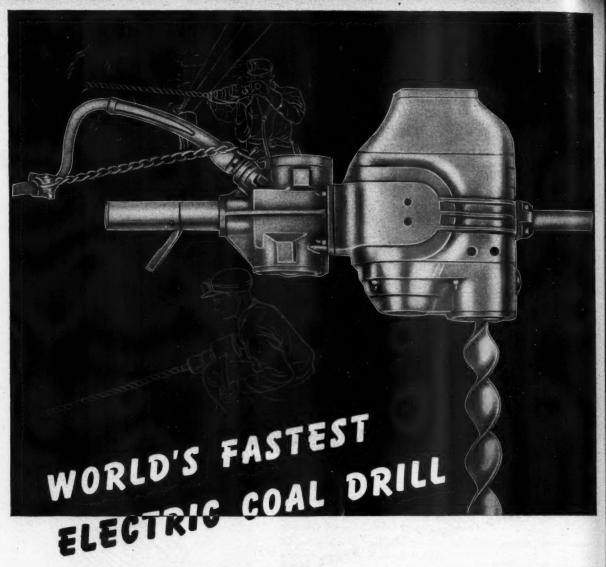
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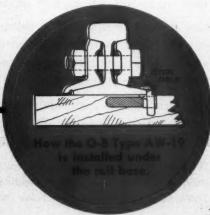


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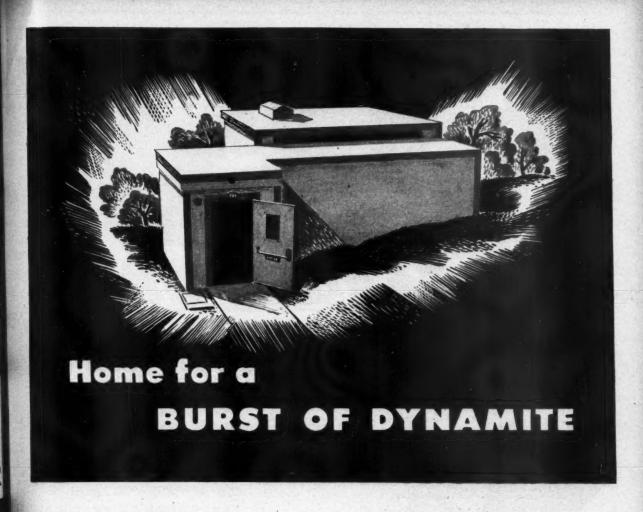
-up of the elevating mech Note the safety bars.



saddle that the lifters can ordinarily be drilled without turning the machine under the ber.

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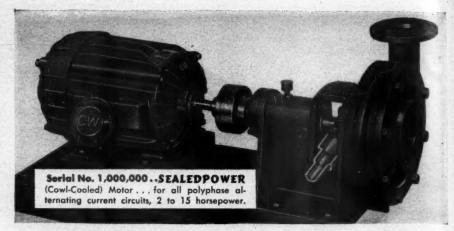
#### HERCULES EXPLOSIVES---

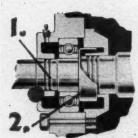
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Serial No. 1 . . . Crocker-Wheeler Motor, built in 1888.



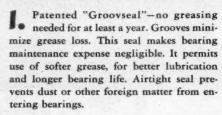


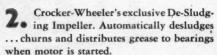
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MAN-HOURS

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To meet wartime needs will call for the mining of 660,000,000 net tons of coal in 1944—a considerable increase over 1943. The mines are faced with the problem of getting out this tonnage with 60,000 fewer men.

Those figures are one of the reasons why Bethlehem's Preformed Track has such a definite spot in the plans of mining engineers. For "preformed" means exactly what it says—means that the track has been figured, cut, bent, and fabricated in Bethlehem's own shops, and reaches the mine ready to assemble. What does this add up to?

First, it saves you considerable paper work. After Bethlehem engineers have received the details of your layout, they take over the job of calculating curves, turnouts, etc.

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Third, it speeds up track-laying to such an extent that you can release men for other, more productive work in the mine.

And this last is the biggest point of all, right now—the saving of time and manpower. Case histories have proved that Bethlehem preformed turnouts, for example, can be laid and recovered in about half the time required for ordinary types.

If you haven't yet used any preformed track, a Bethlehem engineer will gladly give you facts and figures.

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TODAY, when the demands of war call for greater and greater tonnage, you need locomotive batteries with the extra wallop...high capacity...absolute reliability to keep mine production at peak figures. You get that kind of battery performance in a heavy-duty Philco—and you get it hour after hour, day after day! It's built into every cell! In a Philco you get the famous Floté grid design for low

internal resistance..."K" Process plates for sustained high voltage and extra capacity... Triple Insulation for long productive life. These and many other features of Philco advanced construction and modern design add up to the most efficient battery you can buy for today's mine service. For complete information and specifications, write for the latest Philco Mine Battery Catalog.



PHILCO CORPORATION, STORAGE BATTERY DIVISION TRENTON, NEW JERSEY

Specify PHILCO Mine Batteries



#### Protect Your Essential Manpower

LOCAL Selective Service boards now have instructions from General Hershey which give operators of essential mining enterprises as well as mining machinery manufacturers a definite understanding of their prospects for retaining their present manpower supply. While the new regulations contain much bad news, they are still a relief from the state of uncertainty in which we have been working.

Specific deferment requirements have been set up for each age group. In the 18 to 25 bracket, only a small number of "irreplaceable" employes of special technical qualifications in specified war programs may be deferred; approximately 10,000 coal miners in eight states may receive deferment, but basic industries generally must get along without these young and vigorous men.

A recent Hershey statement to the press established strong conviction that very few men of age 26 to 29 will be wanted by the armed forces in the next six months. A man in this bracket may be deferred if he is "necessary to and regularly engaged in" an essential industry. He must be qualified as one who cannot be replaced by a woman or by another man not eligible for early induction.

In the 30 to 37 group, a man may be re-classified or deferred if he is "regularly engaged" in an essential industry.

Employers are thus given a definite blueprint, which, barring unexpected reverses in the combat theatres of the war, seems likely to be followed during the balance of the year. They must, however, be vigilant in seeing that the new directives are properly applied to their own operations. Local boards have been instructed to reopen the records of all men of ages 26 to 37. The Selective Service Director has made it plain that while it is presumed that local boards will re-classify registrants in accordance with this order, it is up to individual employers and employes to protect their own interests. Request for deferment or reclassification for a necessary man can be filed even if he is already scheduled for an early induction or medical examination. His case can be reopened and if the local board refuses reclassification or deferment, appeal to the State Director of Selective Service is in order.

The mining industry, already critically short of manpower in most areas, is hard hit by the prospective loss of many of its most valuable younger employes. Operators therefore must use every available means under the regulations to insure retention of all remaining manpower, to keep up needed production and to maintain their properties in operating condition for the future.

#### Mining—Worthy Occupation

OUR attention has been drawn so much lately to the need for more "miner recruits" that we think some comment on the distinctive advantages of this occupation might be timely. Aside from the urge to contribute importantly to current economic needs, the embryo employe should note several definite personal advantages sufficiently attractive to invite permanence of occupation. The disinclination of men to work in mines is all to often due to popular misconceptions of working conditions and scant infomation on opportunity for advancement.

The wide diversity of trades found in the mines should offer variety sufficient to suit the tastes of many. To mention a few, there are places for mechanics, electricians, plumbers, clerical workers, draftsmen, surveyors, chemists, engineers, as well as a whole host of specialized mining jobs requiring mechanical talent. Some may be surprised to learn that the kinds of work offered are as numerous and differing as those encountered in a large city.

Training in the operation of many types of machines used in mines, and instruction in safe workmanship and health preservation is especially well organized at modern mines today, making the occupation worthy of our best men. Clean, well designed sanitation facilities make it possible to enter the mine grounds in good street clothes, change to work clothes in comfortable quarters and after work reverse the process, taking a shower in stride.

In the great majority of mines the atmosphere is cool in summer and warm in winter. Successful steps are being taken to eliminate uncomfortable conditions in the hotter mines. The coming hot weather therefore need not worry the miner during his working hours and correspondingly he will not experience severe cold next winter.

So the advantages that accrue to such employment are many and varied. Here is by no means a petty field of endeavor. Current information indicates that the miner's wage of today far removes him from anything like poverty. Recent published reports indicate substantial yearly earnings by non-supervisory employes which compare favorably with any industry in this country.

These are concrete inducements for those who will work to merit them; and if studiousness and earnest endeavor are found in a man's make-up, he may well expect appointment and advancement along supervisory lines in the due course of time. The prospective recruit may ponder with profit on the many benefits of mine employment.

#### The Gold Mines' Problem

How the order banning gold mine production has affected workers, mining communities, mining companies and stockholders

WE of the gold mining industry of the United States are unanimous in the opinion that the order of the War Production Board forcing suspension of production at all gold mines which did not have important byproduct metals was an injustice to the workers in gold mines, to the gold mining communities, and to the stockholders in gold mining companies. I shall outline our reasons for this opinion. In so doing I shall offer evidence from our own community at Lead, S. Dak. Data as to the results in Lead will not differ from those in other gold mining communities except in degree.

The order suspending production from gold mines was issued by the War Production Board at the insistence of the War Department on the theory that mining of gold is nonessential in time of war. I shall not argue this question. But I do want to emphatically state my opinion that this is a question of vital importance that should be decided by the Congress and not by the War Department nor by the War Production Board with the trite argument that "you cannot shoot gold bullets." That argument was the only one that was presented at the hearings in Washington at the time the order was issued.

At the outset I wish to say, that all who are concerned with the production of gold, including workers, operators, stockholders and business men in gold mining communities are just as thoroughly patriotic and as deeply interested in doing everything possible to speed complete defeat of the Nazi and the Japs in this world conflict as anyone in the country. The way in which the gold mining communities have taken this order, which they all deem to be unjust, and the fine spirit in which they have carried on with war work, oversubscribed war bond quotas and other war fund drives is ample proof of that.

The gold mining communities have an exceptional record for number of men in the armed forces. It is with,

I trust, pardonable pride that I cite the service record of the Homestake Mining Company and our own city of Lead, which is doubtless typical of other gold mining communities. There are in the armed forces of the United States 426 employes of the Homestake, equivalent to 19 percent of its total number of employes. There are in the armed forces of our country 898 citizens of the city of Lead, equivalent to 12 percent of its population. you doubtless know, Lead's population consists almost wholly of Homestake employes and their families. These percentages are computed on the population of Lead and Homestake employment in 1940 and not on today's greatly reduced numbers. Our community takes commendable pride in this record. We believe that the percentage of our citizens in the armed forces of our country is the greatest percentage enjoyed by any community in the United States. It is almost double the average percentage for the whole country.

We of Homestake have repeatedly stated that we would not have appealed from this order nor in any other way questioned it if the following conditions had been met: (1) If it were essential for an all-out war effort; (2) if it could be made effective in the accomplishment of its avowed purpose; (3) if equal treatment were accorded to all workers in all industries; (4) if there were comparable treatment of the gold mining industry in allied or other countries.

I have no hesitancy in saying that the gold mining industry as a whole is in full accord with this attitude.

I shall discuss each of these conditions and show that not one was met but that, on the contrary, this industry was singled out for special and unusual treatment.

#### Shutdown Value Overestimated

As compared to industry as a whole in this country or even to the gold mining industry in some other countries, gold mining in the United States is a small industry. When this order was under consideration there were numerous newspaper items and state-



By GUY N. BJORGE

General Manager
Homestake Mining Co.

ments on labor statistics to the effect that 6,000, 8,000, 12,000 or 15,000 miners were engaged in gold mining and closing of the gold mines would make these available for non-ferrous metal mining. These figures were all overestimates perhaps as a result of using old data. Gold mining, and particularly those districts that were fairly close to war industry centers, had already lost a very substantial percentage of its employes. In some districts less than 25 percent of the number employed in 1940 remained and these were old employes that could not well be asked to leave for other employment. Homestake, because of remoteness from war industry centers and other favorable conditions, was in a better situation than any other mine. While half of our normal number of employes had left to enter the armed forces or to go to war industries, replacements had been available locally and when this order was issued we still had about 80 percent of this number.

Throughout the entire country, the number of men that would be displaced as a result of this closing order and so available for work elsewhere, was actually but slightly more than 2,500. It can hardly be argued that this number of men made the closing order essential to the war effort nor that the results could justify the economic dislocation in our gold mining communities.

The avowed purpose of this order was to obtain men to make up the shortage at non-ferrous metal mines and particularly copper mines.

There was not then, nor is there even yet, any legal machinery for

As presented to the joint meeting, Western Division, American Mining Congress and Colorado Mining Association, Denver, Colo., January, 1944.

drafting labor. But here, the small number of men in gold mining were singled out for virtual draft and replacement of men that had left their jobs in copper and other non-ferrous metal mining for jobs that were more attractive to them. Naturally the men in gold mining, if they were to be forced out of their jobs and compelled to leave their homes desired to go to work that appeared most attractive to them.

When the order for closing of the gold mines was under consideration, representatives of some of the gold mining companies were called to Washington for a hearing. This hearing was held on October 1, 1942. A review of current employment at gold mines made at this meeting indicated that, if the closing order were issued, the total number of men that would be released would approximate 2,500 and that non-ferrous metal mines would probably get about 500 men. These estimates have been very closely borne out by results. It is my information that the total number of men obtained by non-ferrous metal mines from the gold mines for the entire United States as a result of the closing order lies between 500 and 600 men. It is obvious then that the order did not accomplish its purpose.

Let me call your attention to the wording of one paragraph of Order L-208 which is as follows:

"(b)—Restrictions upon production. (1) On and after the effective date, each operator of a non-essential mine shall immediately take all such steps as may be necessary to close down, and shall close down, in the shortest possible time, the operations of such mine."

I have not read all orders of the War Production Board, in fact, far from it, but this is one of the rare orders specifically requiring the clos-

ing of any business or industry. Other industries were denied the use of critical materials for making specified articles. But they were not barred from operation if they could get along with substitution of other material. I understand that there were some other industries that were ordered to cease operation unless they were producing for war purposes, but I believe that they were very few.

#### Mine Plant Not Readily Convertible

Then, too, most types of industry could convert to production of war materials. Not so with mines. Theyare generally in fairly remote places. The plant is designed for the mining and beneficiation of ores from that particular mine. Such a plant cannot be converted to other production nor moved to another property such as was suggested by a Washington news commentator who proposed, "Among other things that the Homestake mine in the Black Hills of South Dakota, one of the largest in the United States, be closed and its machinery moved 20 miles to an important tin deposit."

According to reports of the United States Geological Survey and the United States Bureau of Mines, there is no important tin deposit. With the great shortage of tin it has not been recommended that these deposits be equipped and operated by the Government under an agency contract. Of course, mining men know pretty well that equipment for a deep mine could hardly serve for a mine that was starting from the surface; perhaps we might pull up the shafts and move them over and put them down in another place. Homestake is in war production work from its shops and foundry and from its sawmill but

these are a small part only of its entire mine plant.

Of necessity, gold mining communities are one-industry communities So the closing of the mines is destructive to the entire economy of such a community.

You, of the mining industry, are aware of the maintenance cost for mines with production suspended. It is not simply a problem of closing, locking the door, and waiting for the day when production may be resumed. Water must be pumped, shafts must be kept in repair, heavy ground must be supported, rotting timber replaced, etc. The cost will vary with the extent and depth of workings, quantity of water, ground condition and many other factors. Homestake is 5,000 ft. deep, has four deep shafts, over 200 miles of level workings with over 75 miles of underground track to be maintained. Our net shut-down cost for the last six months of last year exceeded \$110,000 per month. cost of other companies was in proportion. Any company not in a strong cash position when Order L-208 became effective was in serious danger of losing its property or closing down with no hope of ever reopening. Some mines have been permanently closed and plants dismantled.

Now, as to employes of gold mining companies. I have shown that there was an attempt at virtual draft of these workers even though there was no legal machinery for drafting labor. Was this equal treatment for all? A large percentage of gold mine employes were home owners. They were compelled to leave their homes which could not under the circumstances be rented or sold, and to go long distances to other jobs. In our community at Lead, S. Dak., a town of 7,500 population in 1940, we have over 800



Homestake's Ellison shaft and plant which stands and waits until gold mining can be resumed

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vacant homes and apartments and some 28 vacant business places. Large numbers of good modern homes stand empty with windows boarded up.

What of other non-essential business or industry? I shall not enumerate but you can see businesses and industries on every hand that are certainly less essential than gold mining which are still flourishing.

Such was the treatment accorded the American gold mining industry. Contrast that with the consideration given by our Government to the gold mining industry of foreign nations and also the treatment of the industry by the British government.

Let us look at the record of the gold mining industry of other countries before and during the war. First in the British Empire, which has been at war for 27 months longer than we have. Naturally we come first to the greatest gold producing area of the world-the land of South Africa. An issue of the South African Mining and Engineering Journal of January 30, 1943, reviews the industry there for the preceding 10 years. From 1933 through 1942 there was steady increase in production. Annual ton-nage increased from 36,383,800 to 66,979,700. Output of gold increased from 10,413,473 ounces in 1933 to 14,039,912 ounces in 1941, with a slight decrease in 1942 resulting from a slight drop in average grade of ore. An all-time record in both tons mined and gold output was made in the first six months of 1942.

For the first nine months of 1943 South African production was 9,637,000 ounces as compared to 10,720,000 ounces in the like period of 1942, a decrease of only 10 percent. What gold producer in our country would have objected to a war-time reduction on a similar scale?

Now, as to the industry in Canada. In its preliminary estimates for 1943 the Dominion Bureau of Statistics



The many and varied operations underground cannot be stopped and started at will without excessive cost

plans Canada's output of gold at 3,-649,671 ounces as compared to 4,841,-306 ounces in 1942, a decrease of 24.6 percent. We should hardly complain of a war-time reduction in like proportion. The New York Times for January 8, 1944, referring to Canadian Gold Mines, states: "The Canadian government also has taken steps to furnish mines additional labor where they have not sufficient manpower to continue operations." much for the treatment of the industry in the British Empire. Our good neighbors to the south are still operating their gold mines and are receiving equipment and supplies from the United States and in some cases selling their gold to us. Gold mines in the Central American republics and in South America are operating. I do not have late statistics that permit comparison of present production with that of 1941 and 1942.

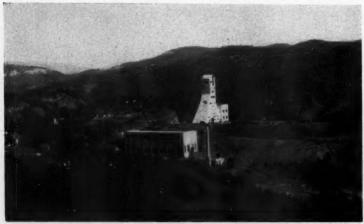
The Peruvian American Digest in its issue of November 1, 1943, has the following item under a Lima date line:

"To maintain Peruvian gold mines in operation, the United States Government will grant facilities for the supply of necessary materials and equipment. This announcement was made at a special meeting called at the Mining Bank of Peru and attended by the managers of the principal Peruvian gold mines."

In contrast to the foregoing production records of other countries, United States gold production, according to the American Bureau of Metal Statistics, decreased from 5,980,746 ounces in 1941 to 3,618,503 ounces in 1942 and an estimated 1,375,000 ounces for 1943. This reduction does not tell the full story for the gold mines as 65 to 70 percent of present production is a by-product from the mining of other metals, principally copper. During the last six months of 1943 production from major gold mines in the United States was exactly zero.

Our misfortune seems to be that we are simply members of the family—homefolks—instead of some more or less remote neighbor.

In all fairness, we of the mining industry urge that Order L-208, suspending operation of gold mines, be rescinded at the earliest possible date and at the same time and in connection with such rescission, a just and liberal policy with regard to priorities and manpower be adopted in order that the industry may gradually get into production.



The Ross head frame-silent sentinel over extensive idle workings



41/2-yd. dragline on crop stripping. Contractors have helped the national war production considerably. After the war they will probably go back to previous work

## The Future of STRIP MINING in the Northern Appalachian Field

Some present operations will have to be modernized or else drop out of the picture when the present emergency has passed

UNTOLD millions of tons of low-cover stripping coal are to be found in the Northern Appalachian Field; however very few large blocks seem to be available, such as are found in the Mid-West. Most of the areas involved are limited to a few hundred acres or smaller.

Nearly all of the possible stripping locations in the field should be carefully examined before attempting to set up a mine. Core drilling is necessary in every location with the possible exception of a few areas of the uniform Pittsburgh No. 8 coal. In eastern Ohio and western Pennsylvania this coal is constant throughout and (except for old underground workings) can be counted on for a good workable seam.

Rock is a strip miner's nightmare. However, in all but isolated cases, the rock over the No. 8 seam can be handled by normal drilling and shooting practice. This is not true with other seams throughout the field. For example, at one place in central Pennsylvania several years ago, the writer did some prospecting work on top of a mountain; the "A" seam coal was found to be 4 ft. thick and of good quality under the highwall of an old strip mine. The highwall being quite low, it was thought that the property might be reworked to a higher cover, especially since the visible overburden was composed mostly of soft shale. When core records were obtained for this mountain top it was found that hard sandstone was present in erratic pools, ranging up to 40 ft. thick and lying directly above the coal, and in some places the heavy rock had replaced the coal entirely. This hazardous condition is not unusual throughout the field in various coal seams. It is, therefore, difficult to tell just how much of the large tonnage under low cover can be mined, but after careful consideration



By WILLIAM L. BURT
Vice President
The Jefferson Company

with prospecting data available, stripping operators may find several hundred blocks of coal that can be mined successfully.

Many pre-war excavating contractors have taken to stripping in order to put their equipment to work during the war and have increased the total U. S. production materially. Without too much time used in prospecting work these operators have

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Small stripping shovel on crop work

gone ahead, and consequently many have fallen by the wayside because of unpredictable heavy rock, mined out underground areas, slides caused by steep hillside cuts, etc. However, nearly all of these contractors will go back to construction work after the war and therefore have taken many short cuts to their mining practice that would be disastrous to large stripping operators with larger overheads and higher costs.

While it is difficult to segregate the total tonnage mined by contractors, it can be said that most of the increase in production from this field during the past two years has come from these operators. This is quite a help to the coal industry generally in meeting its annual demands for war production.

There are very few old timers in the field at this time and I believe they will stay after the war. Their mining layouts are complete and they know what they have to handle and have applied the equipment best suited for the job.

#### Fields and Equipment

Obviously it requires a very large tonnage of coal to open operations using large stripping shovels. date there are a few of these machines in the eastern Ohio and western Pennsylvania fields and one or two in northern West Virginia.

Eastern Ohio is probably the most advanced field in mechanical development in the northern Appalachian area. Since 1933 this area has de-

veloped rapidly, largely because of the sizable blocks of Pittsburgh No. 8 coal available. This is owned by several operators. Since 1939 three new stripping shovels have been added. Two of these are 17-yd. machines and one, recently installed by the Hanna Coal Company, is a 35-yd. -the largest shovel ever to be manufactured in the world. The recent addition of several large draglines in Ohio also proves the great importance of this field. One walking dragline is now working in tandem with a 17-yd, shovel on the Jefferson Company's property in Jefferson County. This machine on crop stripping carries a 160-ft, boom and 10-yd. bucket and will handle approximately 300,-000 yds. per month. When all outcrop coal is mined out, this machine will carry a 200-ft. boom and an 8-yd. bucket and will strip the top cover from 50 ft. to 80 ft., leaving the 50-ft. minus for the 17-yd. shovel working in tandem. Most of Ohio's stripping machinery is powered electrically. Mineral reserves for strip mining should last for 30 years with this addition of draglines to work in tandem with shovels.

A great many small operations are located in other coal seams in the northern part of Ohio near Youngstown. These areas are for the most part isolated from each other and consequently small equipment is best suited for this stripping. However, there are several large operations with modern shovels and draglines. They have been quite successful because of their close proximity to the Youngstown, Canton, Akron and Massilon industries.

Western Pennsylvania has two major stripping fields. The Burgettstown (Pittsburgh No. 8) field has been stripped for years and recent estimates show this field will be prominent for many more years to come. New operations have sprung up in the last two years which add materially to the annual production.

Large excavating equipment has been in use for some time.

Compared to Ohio and western Pennsylvania the northwest section of Pennsylvania is relatively new in coal stripping operations. Here the Freeports, Kittannings, Brookville, Clarion and Sharon coal seams are all stripped at different localities and the field in general shows great prospects for the future if prospecting and preparation are carefully carried

Central Pennsylvania and Connellsville have also gained importance in stripping fields recently. Most of the mines have been using small equipment and many of the contractors, referred to above, are located here.

Contractors are mining a large amount of stripping coal in the Clarksburg, W. Va., area. Here the Pittsburgh No. 8 coal attains a thickness of from 8 to 10 ft. This heavy coal is ideal for strip mining from a "ratio" point of view, that is to say, yards moved to tons uncovered. However, most of the area has a steep hillside topography with small individual blocks, one outcrop cut being all that is possible in many locations.

Several isolated mines in eastern and southern West Virginia have made their appearance during the war and have a good chance for continuing after the war because of the high quality of coal. Stripping conditions are quite hazardous in these areas and require extensive prospecting.

The future life of strip mining in the Northern Appalachian Field depends upon several factors. There is no doubt but that the war has caused the tremendous expansion in stripping in the last two years in some areas. Pennsylvania and Ohio have had small increases which may be classified as normal, or in proportion to the general increase in nationwide bituminous production. West Virginia developments, however, are definitely a result of the war as can



Modern stripping in eastern Ohio. 10-yd. dragline in tandem with 17-yd. shovelcapable of stripping 80 ft. of overburden

be seen by the following production figures:

1941 1942 Tons Tons Tons (Estimated) 1,100,000 2,409,098 4,500,000

Here we have a 300 percent increase in two years, nearly all of which can be attributed to those small operators who were excavating contractors prior to 1940. The possibility of these mines being able to live after the war is doubtful since the markets have not had time to digest the potentialities of strip coal.

To convert to strip coal from deep mine coal was unheard of by most consumers prior to the war. These consumers found themselves short on tonnage and most of them have taken strip coal because there has not been enough deep mine coal to go around. Whether or not the small strippers will stay in business depends upon what they are shipping right now. Limited equipment has kept most of them to under 40 ft. of overburden and in many cases they have shipped soft, stained coal, mined very close to the surface.

There is a definite market for socalled "crop" coal. The larger strippers have supplied it for many years and with their normal and planned preparation facilities will be able to hold their market after the war.

The life of the contractors using small equipment also depends upon whether by careful preparation they have convinced a large number of consumers that crop coal will work; and if this has been accomplished, whether or not these large users who now buy this coal will stick with the producers of it after the war. We have two unknowns, consequently a prediction at this time would be meaningless. One fact that does influence the picture definitely is the preparation now given coal and the future cleaning plant plans of the larger strip operators. Most of these producers have definite plans for coal washeries and some are already preparing their coal in this way. throws a different light on the small operators' problems in that it practically compels them to prepare their coal in the same manner in order to compete. Another angle that has not been mentioned is the sales job that is now being done on strip coal. Large sales agencies, who have taken on a line of stripping coal to sell, treat it merely as a war necessity and have not paid too much attention to its post-war possibilities. The job of educating consumers to use strip coal is a 'ough one but it can be done and has been done in the past. In this connection I would like to repeat a paragraph from my article which appeared in THE MINING CONGRESS JOURNAL in February, 1943:



The Jefferson Company's new 10-yard walking dragline

"During the last war, many strip mines earned for themselves a bad reputation for coal preparation. In the mad dash for production, many a sulphur ball, railroad spike, or chunk of fire clay found its way into the fireboxes of the country. It has taken 22 years to live down that reputation and careful preparation has done the job, either by cleaning plants or by hand picking. Is it not worth while, then, to maintain our present standards and improve them if possible so that we may preserve the good reputation which we now enjoy?"

This thought has been, I believe, neglected except by a few operators and I am quite sure that those who are now failing to prepare properly

will be looking for a place to sell their coal after the war.

It is not too late yet to prevent this. The job must be accomplished by cooperation between the operating and sales departments. No one is better equipped than a sales agency to create the future markets of any product, and by passing along its findings to the strip mine operator as to which customer can and will continue to use strip coal and what type of analysis is necessary to satisfy him, such an agency can establish a good reputation for the product that will remain after the war. The operator in turn must cooperate 100 percent with the suggestions furnished him by his agent.

#### **Bituminous Coal Institute Meeting**

The first meeting of the members and contributors to the Bituminous Coal Institute was held at the Hotel Biltmore in New York on April 11, at which 32 members of the organization were present. The meeting was called by the president, Mr. Fred S. McConnell, for the nomination and election of directors for 1944-45 and to hear the report of the Institute's activities since its inception nine months ago. The report was presented both verbally and with exhibits by Harry M. Vawter, director of the Institute.

The 15 new directors of the Institute who were elected to serve for the forthcoming year include: O. L. Alexander, Henry T. DeBardeleben, J. D. Francis, Calvin Holmes, R. L. Ireland, Jr., R. E. Jamison, Ralph Knode, Hooper Love, Fred S. McConnell, J. B. Morrow, Daniel A. Newhall, M. L. Patton, George W. Reed, Grant Stauffer and J. P. Williams, Jr,

Three new members, representing coal mining companies with a total production of over 5,000,000 tons per year, signed up for membership in the Institute to further its public relations program of acquainting the nation with the facts about the bituminous coal industry. It was announced that membership in the Institute had increased from 53 to 74 members since it was launched last summer.

The policy committee of the Institute is comprised of J. P. Williams, Jr. (chairman), R. L. Ire'and, Jr., R. E. Jamison, Grant Stauffer, George W. Reed and J. D. Francis.

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## How to Present a Dispute Case to the War Labor Board

OUR dispute with the union is coming up before the War Labor Board next week—and then we'll have our day in court!"

When a prominent industrialist told me that some time ago, I needed no other basis for prophesying that his company would lose its case. Like so many others who have tried and failed, he was licked before he started—defeated, not by the union, but by his own warped point of view.

I know this company well. It is a progressive firm, with forward-looking management. Its labor policies are sound in the main, and it has a splendid war-production record. The activities of its labor-management committee have made headlines in the industrial press. Its profit-sharing plan is widely copied. But in spite of this background the company lost out in advance with the War Labor Board. Why? Because its top management adopted a legalistic attitude in regard to the hearing, instead of embracing what may be termed the sales approach.

A hearing before a War Labor Board panel is not a "day in court." The whole concept of good labor relations is shattered when you approach a labor-management controversy as if it were a legal dispute. True, you and the union have issues to settle, but they should be regarded in the same light as the friendly issues which business partners sometimes consult a third party to resolve. This is not litigation in which one contestant tries to "do" the other party. The whole practice and procedure of legal adjudication is foreign to the subject.

#### Good Will Important

The average litigant before a court of law cares very little about the good will of his opponent. Except as a means to an end, he cares little more about the court's opinion. The liti-gant has "rights" and he battles to protect them. A favorable verdict is the only thing that matters. But this is not the case in a WLB hearing. You do care about what your employes think of you, and will want to give the union representatives no ammunition for a post-hearing barrage. You are interested in showing the Government and the general public that your labor record and policies are sound. To "win" the "case" and Comprehensive advice and instruction on how to approach this war-made situation effectively

sacrifice these twin objectives would be to exchange the substance for the shadow.

Let's compare the legal and the sales approaches to the problem. What does a company do when its legal rights are being jeopardized? It calls in a lawyer, who then looks up the statutes and rulings and precedents and prepares a brief. When the case is tried in court, the laws of evidence are strictly adhered to. The attorneys for each side try to limit and discredit the testimony and witnesses offered by the other. It reduces to a battle of wits—and the devil take the hindmost.

But what would this same company do if the problem involved, not a patent infringement or a negligence suit, but a chance to capture an important market? An outside expert would be called in, but this time he would be a marketing consultant or an advertising agent. He, too, would draft a written document-but it would consist of an analysis of the product to be sold; an appraisal of the market to be invaded—and a plan of advertising, publicity and promotion designed to achieve the goal. It would be a plan that (1) establishes the company as a dependable source; (2) establishes the item to be sold as a good product, and (3) insures the prospects' lasting good will. "We may not sell them this time," the president will agree, "but this will pave the way toward future business."

Both the lawyer and the sales consultant begin with the same first step: they put their case in writing. That is the first thing you should do if you have a dispute to settle before the War Labor Board. Don't reject this advice as being obvious: many companies still come before War Labor Board panels or hearing officers without a written record of what the contest is about.

The second step in this sales-minded approach (and this is the *only* approach that the Labor Relations In-



By O. C. COOL

Director

Labor Relations Institute
New York

stitute recommends to its members) is to draw up a "Statement of Facts" which presents a brief picture of your operations. Never assume that the War Labor Board knows anything about your company. Tell the panel members or the hearings officers in writing what products you manufacture and how much of your equipment is devoted to war production. Play up your industry and its contribution to the war effort.

Of course, this is background material, but it supplies the necessary back-drop for Scene 2—a written statement of your company's labor policies. Do you have a labor-management committee? Do you have a profit-sharing or pension plan in operation? Do you pay awards for suggestions? Have you a good record in regard to absenteeism, work stoppages, etc.?

Next—and this is important—prove in your written statement that the issues in dispute were the subject of persistent and serious collective bargaining. Show how minor disagreements were settled through round-table discussion. Then emphasize the importance of the questions which the Board is called upon to settle.

Finally, summarize your presentation. If you have included in your

case everything that should be covered, it probably will be too long for the War Labor Board officials to grasp quickly. A three-page summary or digest will sharpen up your points and make them easy for the Board to understand.

Perspective is an important quality in your presentation. That is why these statements and the digest should be drafted by someone outside your own organization. Management is usually too close to the situation to write objectively and effectively. Like the marketing consultant or the attorney referred to, the labor relations counsel is an independent adviser in his own line, and it is better to trust to his judgment than to "fill your own teeth," as the familiar saying goes.

When the actual hearing date arrives, retain your "sales" approach, go to the hearing as you would if you were filing a bid for business. Act as if the panel members were the prospective customers and the union representatives your friendly competitors. Shake hands all around

when you come into the room. Have some friendly words for the union officials. Demonstrate by your actions that your goal is an equitable, mutually agreeable formula, rather than a triumph for your "side."

The union will probably be allowed to present its case first. Give the labor man a full chance to tell his story. Don't jump up every minute with interruptions. Don't look bored or indignant while he is speaking, or register impatience with his statistics or exhibits.

Be courteous with the panel, too. When you speak to the panel members, always address the chairman. That respect is due him, and accords with orderly procedure. Furthermore, the chairman may be the one to cast the deciding vote.

Never question the Board's jurisdiction or stand on your "constitutional rights." The hearings officer and panel have ample authority under war-time powers of the President. Taking such a line will be re-

garded as obstructionism by the panel, and might lead to a harsh directive. It is always better to stand on your merits than your rights.

It is also important to remember that neither the panel nor the hearings officer has authority to render a final decision. They merely gather the facts and make a recommendation. The real verdict comes from the Regional Board. So there is little point in histrionics. All of you are there for only one purpose—to facilitate a solution which will win approval of the War Labor Board.

If you approach the problem in this light, and follow this procedure, your company will have the best possible chance for consideration of its contention—and will have nothing to "live down" or repair later on if the union's ideas are accepted. Always take the long view. Governmental controls over wages, working conditions and collective bargaining are still in their infancy. Mastery of the basic techniques today will be of inestimable worth in the future.

#### Compressed Air Motors Now Adapted to Many Uses

In plants where compressed air is available, the use of a compressed air motor recommends itself both from the standpoint of efficient operation and economy. These air motors are powerful, compact and require only a minimum of attention.

Useful applications have been for intermittent service in such work as the operating of small tools and cranes in shops, garages, mines, freight yards, warehouses and quarries. They are especially adapted in these operations for driving small chain or rope drums and winches, for emery, buffing and polishing wheels, for running fans and blowers, concrete mixers, loading machines, conveyors, etc.

According to the Compressed Air Institute, compressed air motors have in recent years been greatly improved through reduction in weight and other refinements.

Compressed air motors are built in rated horsepowers of from 2½ to 18, under 90 pounds air pressure. Both reversible and non-reversible types are made, the reversible motors having a smaller horsepower rating and a somewhat higher consumption of air, but with greater starting power under heavy loads.

Speeds of non-reversible air motors range from 1,500 revolutions per minute in the smallest sizes, to 750 revolutions per minute in the largest. Reversible air motors range in speeds of 1,200 to 550 revolutions per minute.

Air motors with geared speeds are also made for greater power. These geared motors have a grease and dust tight gear box with suitable gears for increasing torque at the drive shaft with a corresponding reduction in speed.

Not specifically classed as compressed air motors, but often used as such on many applications, is the complete range of portable pneumatic drills, reversible and non-reversible, and grinders. These are available in from fractional horsepower and up and in a wide variety of speeds. They lend themselves readily to mounting for stationary motor applications.



Stationary air motor driving a ventilating fan in a mine

#### Stockpiling—Vital to National Security



By JULIAN D. CONOVER

Secretary
American Mining Congress
Washington, D. C.

OR those engaged in the production of strategic and critical metals and minerals-including the "big three," zinc, lead and copper-there is probably no subject of greater concern for the future than our national policy with regard to stockpiling. To us this is in mary ways our No. 1 problem for the post-war period. Upon its wise handling depend, we believe, not merely the future of great mining and smelting industries and the prosperity of important sections of our country, but the very safety of our nation in the years to come-our ability to meet, if the need should again arise, another challenge to our independence and our way of life. It is a subject in which all of us are deeply and vitally interested.

The importance of this subject far transcends the interests of our own mining and metallurgical industries and those who look to them for a livelihood. It is a matter fundamental to the future strength and security of the United States. The first World War and to a still greater degree the present conflict have shown the absolutely indispensable character of these metals to modern warfare. Without them a nation is powerless to defend itself. To preserve our national existence in any future emergency we must have these basic materials in adequate quantities, quickly available if and when needed for production of munitions and for carrying on a war

The first World War taught us a lesson as to the difficulties, delays and dangers of trying to accumulate stockpiles of deficient minerals while actually engaged in war; but the les-

Address to annual meeting, American Zinc Institute, St. Louis, Mo., April 17, 1944. Excess supplies of strategic and critical minerals at end of war are NOT surplus property to be disposed of but part of the nation's permanent wealth to safeguard our future security

son was soon forgotten. In December, 1919, in a report to the President, Bernard Baruch urged that steps be taken at once to insure adequate supplies of raw materials for future emergencies. Far-sighted men, both in the mining industry and in the ranks of Congress and of Government departments, vigorously advocated such a program. But Congress and the people generally were apathetic, they didn't want to think about the possibility of another war, and for 20 years virtually nothing was done. True, the Army and Navy Munitions Board appointed able committees to study the problems of minerals supply, but as WPB Vice Chairman Arthur H. Bunker recently said, "Stock piles of strategic and critical materials were discussed in the armchair, but not acquired; they were carefully listed and classified, but they were not purchased."

In 1938, as the war clouds in Europe became more ominous, Senator (then Congressman) Scrugham of Nevada succeeded in securing an appropriation for the Navy of \$31/2 million (followed by \$500,000 in 1939 and 1940) for purchases of strategic materials; and in 1939 a bill by Senator Thomas of Utah (Public-No. 117-76th Congress) was passed, authorizing the appropriation of \$100 million for such purchases-of which, however, only \$70 million was actually appropriated and less than this amount expended. Purchases under this program brought to us valuable but inadequate quantities of tin, tungsten and certain other needed materials.

However, when the National Defense Advisory Committee set up shop in 1940, it found that in the main except for industry-held stocks, the cupboard was bare. Not only were we lacking many minerals that had not normally been produced in this country; but even in the case of copper, lead, zinc and others for which our own mines and smelters had been able to supply peace-time require-

ments, we found the available supply far below the rapidly pyramiding requirements of a global war.

#### Costly Experience in Present War

We all know the strenuous and costly measures that were subsequently required to make up for these deficiencies. Aided by premium price plans, Government financing, tax relief provisions, etc., and above all by the energy, resourcefulness, and patriotic sacrifices of mining and smelting men, the mining industry showed its amazing vitality. It emerged from nearly a decade of depression, of discouragement and destructive governmental policies, to set new all-time records for production. Zinc output from domestic mines achieved a 50 percent increase over 1938, while smelter production was doubled. At the urge of the Government, new or increased production was undertaken from a vast number of properties, many of them small or marginal but all contributing to the war needs. Additions to mill and smelter capacity were provided, new plants built, and treatment processes for low-grade and refractory ores were developed under the stress of war necessity. Production had to be expanded at all possible speed and even beyond actual consuming requirements, in order to provide war factories with necessary working stocks and to fill the whole greatly expanded "pipe-line" of metallic products in process of fabrication.

At the same time, foreign sources were thoroughly combed, immense sums were spent in developing production, and valuable shipping was devoted to bringing war-needed minerals to our shores. Quartz crystals were flown from Brazil, tantalum from Africa and tungsten was even flown over the Himalayan Mountains from China to the Indian Ocean.

Necessarily this program involved enormous cost—not only in money (which was, rightfully, a subordinate consideration) but in precious manpower, materials, and time. Projects were started and then deferred or abandoned on the basis that manpower or materials were not available or could be more effectively used elsewhere. After the "pipe-lines" had been filled and current inventory margins built up, cut-backs in some raw materials began to make their appearance. The program was inherently and inevitably wasteful in the extreme—far exceeding the cost that an orderly stockpiling program would have involved.

The highest credit is due to the industry leaders in Washington who have wrestled with this tremendous problem-who are themselves the first to admit that mistakes have been made, but who in the face of all these obstacles have seen to it that our fighting forces are equipped to meet the aggressors on their own territory and to blast the way to Berlin and Tokyo. Through their efforts we have overcome almost insuperable handicaps and have made good our shortages of supply; but the situation has been far too close for comfort, and we have come perilously close to paying a terrible penalty for our lack of foresight.

This must never happen again. We have paid dearly to learn the same lesson once more. This time let us take it to heart, let us make certain that we are not again caught—in a war which may come on us much more suddenly than in the past—without adequate supplies of those basic materials from which the weapons to defend ourselves must be forged.

#### Stockpiles as Insurance for the Future

The surest way to accomplish this is to provide a national stockpile of metals and minerals as a permanent military reserve, in suitable forms for long-time storage and prompt use when needed. This would naturally include not only those metals which, because of limited or no production in this country, were listed as strategic or critical in pre-war days, but also copper, lead, zinc and other metals which have been added to the strategic or critical list because our domestic productive capacity has been found unable to keep pace with the tremendously increased demands of modern warfare.

A permanent stockpile of these indestructible metals should be regarded as insurance for the future safety of our country. It ranks with our air force, our Navy and our Army in serving notice on aggressor nations that our rights must be respected. It may well prolong the peace or shorten the duration of another war. Its cost is infinitesimal against the blood of another generation lost in a still more deadly war. In the happy event that we are never called upon to use

it, it would be the best investment ever made by the American people. A wise man buying insurance on his property is not aggrieved because he fails to suffer a disastrous fire.

I have been speaking of stockpiling from the standpoint of national security because after all that is the big issue in which every citizen of this country is vitally affected, and in which every member of Congress should take an intelligent interest. Presented from this standpoint, the arguments for stockpiling should carry convincing weight in the framing of national policy for the future. As American citizens we in the mining and metal industries have exactly the same interest in the matter as 130 million others whose primary desire is to preserve our country and our way of life in the years to come.

#### Disruptive Effect of Dumping

But national interest is also involved in another phase of the problem in which we are particularly concerned-the avoidance of that utter demoralization which struck our domestic metals industries through the dumping of Government-held stocks following the last war. We are all familiar with the chaotic market conditions, the shutting down of mines and smelters, and the unemployment and acute distress which resulted from that short-sighted policy. The metal mining industry is the principal industrial activity in many of our western states as well as in other sections of the country, and hundreds of communities are dependent upon it for their sole support. Liquidation of the huge metal stocks in our possession after the war would deny employment for a long period not only to many thousands now in the industry, but to those returning from the armed forces who are anxious to resume their normal occupations. The whole economy of important sections of our population would be disrupted, and substantial markets for our own agricultural and manufactured goods destroyed, while the American taxpayer would shoulder a relief load that might well exceed the cost of stockpiling these metals. Not only this, but the enforced shut-down of mines, where maintenance costs are excessive, would mean permanent loss of valuable ore reserves through flooding and caving of workings. The smaller mine owners, unable weather the storm, would be especially hard hit.

Considerations not only of justice to an industry which has done a good war job, but of the national interest in creating a balanced prosperity and in preserving important mineral resources, demand the "freezing" of excess mineral and metal stocks as a reserve for the future.

#### Metal Stocks are NOT Surplus Property

In Congress at the present time there are over 50 bills having to do in one way or another with the disposal of surplus government property during and after the war. Most prominent of these is the George-Murray overall demobilization bill, S. 1730 -Title II of which provides basic policies to guide a Director of Demobilization in handling and disposing of government plants, equipment and materials of all kinds. Other bills, many of a specialized character, are scattered through more than a dozen Congressional committees.

It is obvious that at the war's end our Government will own billions of dollars worth of property acquired for war purposes and not needed in peacetime. This will range from huge plants with their equipment down to socks and shoelaces. Most of the proposals for handling these surpluses adopt the general principle of getting rid of them as rapidly as possible with the least disturbance to normal production and employment.

In looking at this problem, is it not sound policy to hold that our accumulations of zinc, lead, copper, tungsten, quicksilver, and other minerals are not surplus and should not be so considered? These metals are part of the irreplaceable natural resources of our country, and for every pound we have taken from the ground we have depleted our mineral wealth by just that much. The rate of depletion during this war has far exceeded that of any previous period. We do not share the alarmist view now receiving circulation in certain quarters, that we are on the verge of becoming a "have-not" nation-for, given a reasonable economic opportunity, ore bodies, mining districts, and the mining industry as a whole have a habit of confounding the prophets of disaster -but it is simple arithmetic that the millions of tons of metals extracted from our mines in these war years have, to that extent, measurably reduced the aggregate amounts that may ultimately be recovered. No less an authority than Cornelius F. Kelley, chairman of the Anaconda Copper Mining Company, recently warned that "The demands of war have caused a heavy drain upon our national resources, particularly upon our nonferrous metal mines. . . . Our deposits of copper, lead and zinc have been and are being impaired to the point where the netional security demands that they be carefully husbanded."

With this in mind, is it not ordinary prudence to conserve the precious stores of these strategic metals accumulated in these war years—to hold these stocks inviolate against a day of need rather than allow them to be now dissipated? These stocks are not surplus property to be disposed of, but part of the permanent wealth of our country—of priceless value if their existence in readily usable form will help to avert another war.

#### Immediate Access to Raw Materials Essential

As mining men we know that our country's mineral potentialities, looked at in three dimensions, are still vast, that there must be many blind orebodies awaiting discovery, that continued improvements in technology will make available hitherto non-commercial sources of these strategic and critical metals. But this does not answer the problem. Even though our ultimate reserves be limitless, they could not be made available at the time and in the quantities required by a military emergency. The old adage that mine production cannot be turned on like a spigot is all too true.

In the last two wars we have been granted time to gird our strength, both before and after we were plunged into the conflict. But Hitler's Blitzkrieg almost downed our allies, to leave us isolated and in no condition to defend ourselves. The broad oceans which have helped protect us are narrowing, and the next Pearl Harbor might be at San Francisco or Detroit. We cannot count on again having time to start at the bottom, to stimulate production of the copper, zinc, lead and other metals so vital to our defense. If, in spite of all efforts to maintain peace, war be again thrust upon us, it may be too late to make our might effective unless we have these materials ready for immediate

#### A Golden Opportunity to Create Permanent Stockpiles

For some of these metals the stocks available after the present war will be extremely large. With the heavy fighting still ahead, and no certainty as to when the enemy will throw in the sponge, our leaders, while making certain cut-backs, are still calling for high rates of production. Only minor relaxations in civilian consumption are being permitted. It is obvious that the war-end stocks will be immensely greater than those normal to a peacetime economy. In addition to government-held stocks, there will be tremendous quantities of metal in the form of ore, concentrates and process materials at smelters and refineries, and huge stocks of finished metal. scrap and partially fabricated materials at manufacturers' plants. Much of this supply must be disgorged from the swollen "pipe-line" to bring it down to a normal working basis.

In addition, hundreds of thousands of tons of battle-field scrap—shellcases, parts from discarded military

equipment, etc.—will be returned from all parts of the world. Unexpired government commitments for mineral purchases and reverse lend-lease will swell the total. Our own mines, both large and small, will need a reasonable period in which to effect an orderly adjustment of production to market demands, and the excess produced in the transition period will likewise be available for stockpiling.

What better opportunity could possibly be afforded to initiate a realistic stockpile program? Never before have we had such sizable accumulations of strategic materials so readily available, constituting for some of the metals a substantial portion of the stockpile goal which might reasonably be set. In large part, the Government will already own these materials, and no further expense will be required, except for their conversion to the most suitable forms for stockpiling and arrangements for their permanent storage. We shall ignore the bitter and costly lessons of experience if we fail to keep this nest-egg in building for our future security and strength.

#### **Further Purchases**

Naturally the stockpiles thus started will vary in size and relative adequacy to the needs of a future emergency. A goal which has been discussed is a supply sufficient for the needs of a three-year total war, and, without discussing the complex factors involved in translating this to actual tonnages, such a goal has met with favor in some quarters. The attainment of this objective, or any other objective which adequately recognizes all of the factors involved, will no doubt require additional purchases of most of the minerals. Wisely conducted over a period of time, such purchases can do much to cushion periods of low activity for mines and smelters, while securing the needed sup-plies at reasonable cost. Similarly, the processing of concentrates and intermediate products and of secondary materials to stockpile form can be scheduled when excess capacity is available, thus helping to maintain employment.

#### Legislative Proposals

While the basic necessity for stockpiling is widely acknowledged, differences of opinion arise as to the most suitable form of legislation, as to the sources from which stockpile metals should be acquired, and as to administrative details of the program.

One of the most carefully worked out suggestions for stockpile legislation, covering the handling of both primary and secondary governmentowned material; outstanding government commitments; material in the hands of industry; excess production in the post-war transition period;

partially fabricated and finished goods; and military and battle-field scrap, was presented by the U. S. Copper Association at hearings before a Senate committee last summer.

Then there is the amended bill of Senator Scrugham (S. 1582) sponsored also by Senators Hayden of Arizona, Murray of Montana, Johnson of Colorado, and Maybank of South Carolina, which gives particular consideration to small or marginal domestic producers, by continuing their wartime prices for one year after hostilities cease. This feature, together with a bill by Representative Harless of Arizona, H. R. 3991, is designed to "bail out" producers who have undertaken wartime production upon the direct or implied urging of the Government, and as a substitute for the "war minerals relief" legis-lation enacted following the last war. That legislation led to extravagant and long drawn out claims for compensation, some of which are still in dispute; it was regarded as a headache which has lasted for 25 years, and only this month Congress found it necessary to make still another appropriation in an endeavor to clean up unsettled claims.

Certainly mineral producers deserve as much consideration from the Government as manufacturers are receiving in connection with contract terminations; and adequate provisions to give them just and reasonably liberal treatment, and to avoid extended controversies long after the facts have become obscured, merit careful consideration. The amounts involved under some such procedure are relatively small, but provide worth while employment, and would purchase something of permanent value, even though at wartime prices. In extracting such minerals and stockpiling them we would not be using them up, but rather placing them in a position of immediate availability for future

The Scrugham bill further provides a 25 percent premium to domestic producers over the duty-paid import price, if needed to fill stockpile requirements, before purchases from outside this country may be made. Government departments concerned with stockpiling object to this requirement, feeling that it would hamper acquisition of materials not produced in this country; and views within the industry are divided, many feeling that domestic protection should be provided instead through proper handling of the machinery of tariffs and import quotas. Preference to domestic sources in stockpile purchases would be accorded by these Government departments only to the extent of the "Buy America" Act of 1933, as is specified in "Public—No. 117," the 1939 purchasing act. Scrap and secondary materials (non-ferrous) are not provided for in the Scrugham bill but are covered in an amendment recently drafted by the author.

Meanwhile, several of the Government departments, which are understood to include War, Navy, State, Interior, and the Foreign Economic Administration, have been working on stockpile legislation, but their proposed bills have not been made public. Some of these proposals approach the matter through amendments to the 1939 Act, including provision for the "freezing" and consolidation of Government-held stocks at war's end. (Incidentally, while emphasis has been placed on minerals and metals under this Act, its language is broad and covers also other strategic materials such as rubber, quinine, Manila fiber, etc., with arrangements for "rotation" of such stocks to prevent deterioration.) It is understood that differences of viewpoint have existed between the departments over certain features, and that the various drafts have been submitted to the Office of Economic Stabilization for review.

Consideration of strategic material stockpiling may also arise in connection with measures for disposing of surplus property. At present, right of way is being given to contract termination legislation, and there is doubt whether Congress will consider the surplus disposal problem prior to a summer recess. As we have shown, metal and mineral stocks should be excluded from the category of surplus and conserved rather than liquidated. Any general surplus disposal measure should recognize this, and it would be appropriate to include suitable stockpiling provisions in such a bill.

#### General Aspects of Stockpiling

It is recognized that stockpiling has inherent elements of danger to the metal industries, through the mere existence of large stocks that could be dumped on the market. Many indus-

try leaders view this possibility with apprehension, yet have felt it must be faced in the broad interest of the country's welfare. As a corollary, it must be insisted that the full amount of stocks needed for national defense be held inviolate against a future war emergency to be declared by or pursuant to an Act of Congress. No executive agency should have the authority to dispose of these stocks, and it should be the fixed policy of the Congress itself not to release them except in a war emergency. In the light of our experience in this war it is hard to conceive that the amounts accumulated could possibly be too large for the purpose of our protection. A problem of disposal might arise, however, as a result of the obsolescence for military use of certain minerals. In such case, disposal should be permitted, but should be safeguarded with adequate provisions against dumping—against sale in quantities or at prices that would disturb the domestic economy. It goes without saying that a stockpile program must not be made, in any manner, a means of continuing bureaucratic control over the mining and allied industries.

Time does not permit us to go into all the ramifications of this subject. In considering our long-range mineral supply, some have urged the importation of most of our requirements from foreign sources, holding our own reserves in the ground for an emergency. Although the need for importing certain minerals is recognized, such suggestions, however well intentioned, are likely to overlook the fact that most mines are not conserved by shutting them down, by permitting them to cave and fill with water, by scattering their organizations and uprooting whole communities. Additions to our mineral wealth are created not by idleness but by continuous exploration and development work carried on by mining companies, large and small, and by continued application of their technical talent to lower costs, im-

proved recoveries and handling of lower grade materials, in an atmosphere of free enterprise and adequate reward for venture capital. A major need of the mining industry, and of the important regions which it supports, is removal of those hampering restrictions and burdens which curtailed development during the past decade, and renewed encouragement to the pioneer spirit which enabled our mines to make their magnificent contribution to the building of our country and to the fighting of its wars.

#### Legislation Needed NOW

The national need for stockpile legislation, to protect the United States in the future, is recognized, as I have already indicated, by the Army and Navy, by other major Government departments and by many members of the Senate and House of Representatives. Thus far, however, definite action on a bill has bogged down, largely due to the differences over administrative and other features to which I have referred. Congress will recess in June, possibly until after the election, and will then have only a short remaining period until the 79th Congress convenes, when any legislation must be started anew.

Action to impound the strategic metal and mineral stocks that we shall have available, to make it clear that these are not surplus but must be retained, and to provide for orderly creation of a permanent defense reserve of these metals, should be agreed upon and pushed through now, while the Congress and the people as a whole still vividly appreciate the necessity. It is to be hoped that not only the imperative needs of the future but the urgency of prompt action will be recognized, and a bill speedily enacted which will establish a policy covering these vital sinews of national defense that will not find another generation blaming us for having provided Too Little, Too Late.



American mining districts have gone "all out" to meet the urgent demands for war metals

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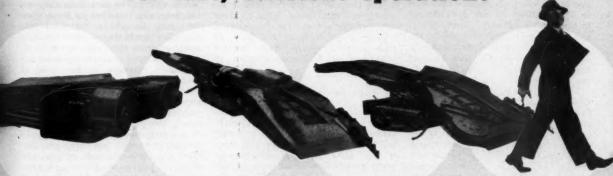
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Fig. I.—Glory-hole created by underground mining operations at Climex

### MOLYBDENUM— Its Applications In The Mining Industry

THE known ore reserves at the Climax Molybdenum mine are sufficient for many decades at the present rate of operation. In fact, we might even estimate the life of the mine in terms of centuries if it would make anyone happier to have it done that way. The future of our operation depends, therefore, on the demand for molybdenum. I shall not try to pre-dict what this demand will be but will outline briefly the applications which exist for molybdenum and let you draw your own conclusions. Mine operators will probably be interested in the applications for molybdenum in the mining industry. Accordingly, this survey will cover very briefly the present general applications and will discuss in some detail those applications which relate particularly to mining machinery and equipment.

The principal applications for molybdenum are noted first: We are all familiar with it as an alloying element in iron and steel. It is used quite a bit as a constituent in various chemical compounds, as a constituent in pigments and colors for paints and dyes; molybdenum compounds are used as catalysts; it is a constituent in a new type of porcelain enamel—a rather new development. As pure

Molybdenum Alloy Steels Find Many Uses in Mining Machinery and Equipment

By TELFER E. NORMAN

Metallurgical Engineer, Climax Molybdenum Co.

metallic molybdenum it is used principally in the form of small sheets and wire in electrical and electronic applications. With the exception of the field of steel and iron metallurgy, where the use of molybdenum is already well established, some of these applications are still in their initial stages of development and may, as time passes, demand much greater quantities of molybdenum than at present.

### High Strength Alloy Steel

In the field of steel and iron metallurgy the greatest tonnage of molybdenum has been taken and probably will continue to be taken by that class of low alloy, high strength steels which we know as the engineering machinery steels. When used in the wrought form these steels are generally classified according to chemical composition by numbers such as the American Iron and Steel Institute numbering system, the SAE numbering system, or more recently the National Emergency numbering system. When used in the cast form they are not generally classified by these numbers even though on the whole the cast alloy steels do not differ much in analyses from the wrought steels.

These alloyed engineering steels are extremely versatile in their field of usefulness. Any one of them is capable of developing a wide range of physical properties, accomplished by varying the heat treatment. As a result these steels, which were designed principally for peacetime applications, have with few exceptions fulfilled the rigid demands of our war effort. I believe we all look forward with hope to the time when they will be back on their peacetime jobs.

The molybdenum alloy engineering

steels became well established during the 1930's. Prior to our entry into the war, molybdenum was used in about 30 percent of the total tonnage of alloyed engineering steels. conditions changed this picture very rapidly. The tremendous demand for alloying metals focused attention on this country's strategic position insofar as molybdenum was concerned. Its use in alloy steels became so general and proved so successful that in spite of greatly increased production, the supply of molybdenum was depleted so rapidly for a time that it became number one on the list of critical alloying elements. This condition has now been relieved so that at the present time the supply of all alloying elements is apparently ample for the needs of the United Nations. It is interesting to note that molybdenum is now being used in approximately 80 percent of the total tonnage of alloyed engineering steels. This is of course quite an increase over what we had prior to the war. The fundamental advantages of molybdenum in these steels are such that we expect its popularity to continue in the post-war period.

Space will not permit me to more than mention the other principal uses of molybdenum as an alloying element: It is used extensively in steels for service at elevated temperatures, in abrasion resistant steels (about which more will be said later), in the high strength structural steels, in tool steels of both the low and high alloy types, in certain corrosion resistant stainless alloys and in high strength cast and malleable iron.

### Mining Uses

Having covered in a very sketchy way the general fields of application for molybdenum we can now consider in more detail a subject which may be of greater interest to the mining industry. Generally speaking, in the equipment used by the mining industry we find that a very high proportion of the steel used is alloyed. The machine parts with which the miner or millman has to deal such as rock drill parts, hoist gears, crusher shafts and a multitude of other parts fall within the classification of engineering steels. The miner and millman are inclined to leave the choice of material for these parts almost entirely to the manufacturer of the equipment who decides on the analysis and treatment which he considers most suitable. This is the proper procedure.

There are certain types of engineering steels over which the miner or millman does exert control. Shafting, axles and bolts for maintenance and repair are typical examples. In specifying alloy steel for these parts we suggest you order it whenever possible in the heat-treated condition since the

full benefit of the alloys is not realized unless the material is heattreated. Relatively few mining companies have equipment available to heat-treat these parts themselves. Of course, when you do order the steel in a heat-treated condition you can't have it so hard that it's impossible to machine it. But generally speaking, you don't want the hardness and strength up too high anyway because such steel lacks toughness. treated alloy steels when tempered to a hardness range between 250 and 350 brinell exhibit excellent combinations of physical properties. They are machinable at these hardnesses.

I would like to pass on a word of warning to those of you who are troubled with fatigue failures in parts such as axles and bolts which are subjected to repeated stress. Don't expect the use of alloy steels to be a cure-all for these troubles. This is primarily a problem in design. There are many new tricks in design which will help avoid these failures. There are several good books and articles readily available on this subject.

An item used in substantial tonnages by the mining industry is hollow drill steel or a combination of drill rods and detachable bits. Swedish drill steel makers report that high carbon chrome molybdenum alloy steels have been used with good results in conventional drill steel. The new combination of drill rods and detachable bits opens up interesting possibilities for alloy steels. Prior to the war a medium carbon Ni-Cr-Mo alloy steel was reported to be giving markedly superior results in the drill rods used with detachable bits. War conditions have, however, prevented its extensive adoption.

For detachable bits a high carbon unalloyed steel is in general use at this time. We can say, however, that

the use of molybdenum or chrome-molybdenum steels for these bits has attractive possibilities insofar as their effect in increasing the wear resistance of the bits is concerned. The use of such steels in bits may, therefore, be a future development.

In the handling of ore at the mine, cast and wrought parts of Cr-Mo, Cr-Ni-Mo and Cr-Cu-Mo steels are giving good service, particularly where abrasion resistance is required. Wearing lips and traction wheels on mucking machines, mine car wheels and certain classes of dipper teeth are examples. Mine cars and skips are now very frequently made from one of the high tensile alloy steels.

In the crushing plants we find high carbon Cr-Mo and Cr-Ni-Mo steels in many crusher rolls, in certain wearing plates for jaw crushers, in some of the smaller cone and gyratory crusher liners and in a number of other applications. While these cast and wrought chrome molybdenum steels have excellent abrasion resistance we would like to point out that care should be taken to avoid their misapplication in service where impact conditions are severe. Austenitic manganese steel is still the standard material for such service.

In grinding plants the ball mills are generally found to have a greater appetite for steel and iron than all the rest of the mining and milling plant put together. Ball mill liners of Cr-Mo and Cr-Ni-Mo steel are now in general use.

Cast chrome molybdenum liners generally have a life 50 to 100 percent longer than white iron liners and are, of course, much less susceptible to breakage. In comparison to manganese steel the chrome molybdenum steel liners are generally superior though the degree of superiority varies greatly. From somewhat limited information it appears that

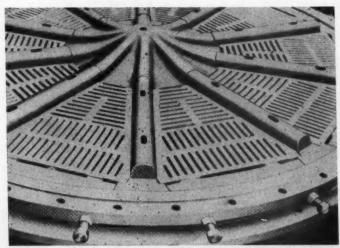


Fig. 2. An assembly of chrome-molybdenum cast steel grates designed for use in a "low discharge" ball mill

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the chrome molybdenum liners show up better in ball mills than they do in rod mills. The recent trend towards the use of low discharge grates in ball mills has presented an interesting problem for cast chrome mo-

lybdenum steels.

During the early stages of production of certain grates made here in Denver it was thought that they should be as hard as possible to avoid peening of the bars by the ball action in the mill. These hard grates gave some trouble from breakage. During the past year it has been demonstrated that the grates should peen to a limited extent. This tends to prevent any plugging of the openings by worn balls. As a result, the grates are now being made softer and tougher than formerly. This should eliminate any trouble from breakage. The analysis and heat treatment of these grates are such that they are giving excellent life records. Fig. 2 illustrates a low discharge grate assembly.

Grinding balls consume a tremendous tonnage of iron and steel annually. In forged and heat-treated steel balls the addition of 0.20 to 0.30 percent molybdenum has been found to increase the wear resistance of the balls very materially. These molybdenum steel balls are now being used in large tonnages in this country.

If we survey the world consumption of grinding balls we find that 75 percent or more of the balls produced are of cast iron. Many mining companies operate their own ball foundries or have arrangements whereby they obtain their balls from nearby foundries and thus save freight charges.

TABLE 1
RELATIVE WEAR OF CAST CR-MO STEEL AND UNALLOYED CHILLED IRON GRINDING BALLS IN SEVERAL TYPES OF ORE

| Type of ore        | Principal Abrasives                 | Abrasion Cr-Mo cast steel |                   |
|--------------------|-------------------------------------|---------------------------|-------------------|
| Gold<br>River sand | Quartz<br>Quartz plus some feldspar | 100                       | 140               |
| Molybdenum         | Quartz plus more feldspar           | 100                       | 150<br>155<br>181 |
| Copper<br>Feldspar | Albite and orthoclase               | 100<br>100                | 181<br>301        |

The use of molybdenum to improve the wear resistance of this cast iron has been disappointing. However, a new and very promising development has resulted from our investigations on cast balls. If the balls produced are of high carbon cast steel instead of cast iron, molybdenum, or preferably chrome molybdenum, is very effective in promoting increased wear resistance.

Table 1 shows the comparative rates of wear we have obtained between well made chill cast iron balls and low alloy, chrome molybdenum, chill cast air-cooled steel balls.

The data in Table 1 are from tests which were run in cooperation with several of our large western mining companies in their own mills or, in the case of the tests in river sand and pure feldspar, in a 3 ft. diameter ball mill at the State Experimental Plant in Golden. The abrasion factors refer to relative rates of wear. For instance, when grinding the gold ore at the top of the list, where we formerly used 140 tons of chilled iron balls over a given period, the indications are that with the alloy east steel, the consumption would drop to 100 tons.

It is interesting to note how the relative proportions of feldspar and quartz in the ore affect the results. In the high quartz gold ore the difference between the cast iron and cast steel is only 40 percent. In the copper ore, which was one of the low grade porphyry types in Arizona, the difference was 81 percent. When grinding pure feldspar minerals the chilled iron wore three times as fast as the chill cast alloy steel.

On the basis of these tests we believe the alloyed cast steel balls have excellent economic possibilities. They can be produced at or near the point of consumption as is now done with cast iron. Their development may be worth watching.

We of the Climax Molybdenum Company are strongly interested in the development of new and better materials for use both at our own plant and for the mining industry in general. For this purpose we maintain a metallurgical service division here in Denver, where problems related to the selection of iron and steel can be brought for assistance and solution.

### Dr. Obert Honored for Microseismic Research

AN ingenious microseismic device for predicting failures in rock supports in mines long before they become dangerous is outstanding among 14 suggestions whose authors—all employes of the Department of the Interior—were singled out recently for special suggestion honors by Secretary Harold L. Ickes.

The new mining device, destined to have far-reaching effects on mining operations—both with respect to human safety and more effective exploitation—was originated and developed by Dr. Leonard Obert, senior physicist of the Bureau of Mines, residing at College Park, Md. He received the award of excellence which carries with it a meritorious promotion and an additional \$200 a year in salary.

Dr. Obert's invention already has proved its value in numerous practical tests. By its use during the past year, when zinc mining was so important to the war, more than 23,000 tons of high-grade ore was extracted

from the Tri-State zinc district of Oklahoma, Kansas and Missouri from pillars where the ore was considered non-recoverable. Equally important results were obtained in iron mines in New York. Vibrations induced by rock movement of as little as one-millionth of an inch can be detected and recorded by Dr. Obert's device.

### Alaska Highway Problems

DIFFICULTIES encountered in erecting bridges over rivers in the Canadian Rockies for the 1,700-mile Alaska Highway were related recently by William K. Green, a designing engineer for the American Bridge Company, on loan to the U. S. Public Roads Administration.

Passage through the wilderness and snow-capped mountains of British Columbia and the Yukon required the construction of numerous bridges. They ranged from one 1,000-ft. suspension bridge down to spans of 200 ft. About 43 percent of all new steel bridges were fabricated by the American Bridge Company and the Virginia Bridge Company, U. S. Steel subsidiaries.

Mr. Green cited the 1,000-ft. suspension bridge over the Liard River in British Columbia as typifying the difficulties overcome. Heavy fabricated sections were transported by truck 525 miles from Dawson Creek, British Columbia, to the site of the bridge. Ice and heavy snows impeded traffic in winter, while spring floods caused washouts and carried away temporary bridges. Unable at times to get through, trucks unloaded steel on the roadside, to be picked up later when weather permitted. Tractors helped trucks to climb steep grades.

Quick erection was facilitated by having all possible work done on the sections before shipment. The use of colored identifying symbols on each piece of steelwork helped shorten the time required for erection. Less than two months after the piers were completed, traffic was passing over the Liard River span.

### In Search of Secrets of Coal

What British engineers are doing in the way of research to bring about a greater utilization of coal

By W. READ

Secretary
British Coal Utilization Research Association

THE British Coal Utilization Research Association has just completed the first five years of its existence. It is, therefore, one of the youngest research associations in Britain, but despite this, it has grown in those five years to be the largest.

In tackling any problem of research, the Association is concerned not only in ascertaining new fundamentals but also in their ultimate application to industry. Once a research project has been decided upon and its probable line of evolution agreed, the work is put into the hands of a team of scientists or engineers or both, led by a person who is highly qualified in that particular sphere.

At regular periods the team makes a report on its work; the report is considered, discussed and criticized by all the senior scientific and engineering staff of the Association, and from time to time, by an appropriate standing committee of the Council of the Association. The junior staff of the team whose report is under review attend the staff discussions too, a procedure which has proved to be of value not only to the individual worker but also to the staff of the Association as a whole. This provides a channel for free and open discussion and also enables the youngest technical employe to hear at first hand, the mature reasonings of older men concerning the ideas and suggestions put forward.

In broad principle, these are the lines on which the Association has been working for the past five years; the efficacy of the methods is shown by the work that has been accomplished.

The war, naturally, has regulated to a large extent the nature of the research problems which the Association has undertaken. For example, between September, 1939 and the middle of 1941, attention was concentrated upon a portable gas producer and a special investigation was made into the use of alkali-activated coke as an alternative to anthracite and charcoal.

As a result of this work, the B. C. U. R. A. Central Draught Producer was evolved and developed to a stage at which it could be tried out in practical operation on the road. Eventually B. C. U. R. A. was able to put forward to the Government an efficient producer-gas appliance which could be mass-produced and would make possible an annual saving of many millions of gallons of petrol.

The work on producer-gas brought to light the need for a re-examination of the current views on the mechanism of gasification explaining the process employed in small producers and suggesting the inadequacy of the generally accepted "two-zone" theory that carbon is first converted to carbon dioxide and then reduced to carbon monoxide.

Plans had been made before the war for an intensive study of the combustion of pulverized coal and a special furnace was installed with complete calorimetric arrangements for the measurement of the heat released and absorbed under different conditions. This work was temporarily suspended but is now again well in hand. It embodies a novel form of control with which, as far as is known, no previous apparatus for the study of flame combustion and of the energy exchanges between the burning fuel and the surroundings, both gaseous and solid, has been provided.

At short notice Britain's Ministry of Home Security called upon B. C. U. R. A. for proposals for a solid-fuel stove for heating air-raid shelters. The specification necessitated rigorous tests to ensure that danger from carbon-monoxide poisoning was, as far as possible, eliminated, and called for a form of stove which could be rapidly produced in considerable quantities from readily available materials. A type of stove was designed, made, tested and approved by the Ministry within four weeks, and within eight weeks of the first receipt by the Association of the official request for



The central draft "producer" was developed by B. C. U. R. A.

assistance, shelter stoves were being delivered at the rate of 1,000 a day.

Investigation of the marked delay in reactivity shown by anthracite when heated is also taking place. This property renders the relighting of partly consumed anthracite peculiarly difficult. The effect has been traced to a loss of "inner" surface (surface accessible to oxygen) when the fuel is heated above 800 degrees C. The method and techniques used in investigating the loss of reactivity in anthracites have been applied to other fuels and it has finally been established that coal substance is of such fine structure that the surface accessible to oxygen molecules ranges from 100,000 to more than a million square feet per pound, according to its rank. The resulting conception of coal as a colloid opens up entirely new fields of work, which are now being actively explored.

Many other aspects of research into coal have been and are being undertaken. For example, one team is working on the heat-of-wetting test; another on the laws of breakage of coal and the size distribution of the resulting broken materials; while a third team studies the subject of boiler deposits and corrosion in air heaters and yet another, the problem of combustion in fuel beds.

Steam engineering has had its particular problems and a team has been working on large-scale investigations in the field of steam generation and steam utilization-in particular, the efficient use of coal in the production of steam and the efficient use of the steam after it has been produced. B. C. U. R. A. continues to work in close collaboration with the Ministry of Fuel and Power on the problems of fuel efficiency and has, in fact, undertaken a large amount of initial research work for that department in connection with its campaign to obtain a better industrial use of coal throughout the country.

### Hot Gas Flow Problems

In collaboration with the Iron and Steel Industrial Research Council, B. C. U. R. A. has made a study of the flow of hot producer gas through steel and brick mains. The results of these investigations indicate that savings in capital cost and improved operation can be realized by attention to flow considerations in the design of mains. The theoretical formulæ put forward have since been confirmed by practical experience.

Much consideration has been given by B. C. U. R. A. during the past five years to improving the efficiency of the open coal fire as used for space heating. This task, it will be appreciated, was prodigious as it involved ex-



Experimental flue tests have aided in solving heating problems



Hales convector fire is one of the highly desirable results of space heating research

amination of the factors controlling the production of smoke and examination of the properties of many varieties of grates, flue throats, flues and terminals. As a result of these experiments, an open fire has been developed which incorporates continuous burning, a reduction of smoke emission to less than half of one percent, the weekly removal of ash (with normal fuels), a thermal efficiency of 44 percent as opposed to the average 25 percent of ordinary grates, optional heating of upstairs rooms by hot air, complete control over combustion rate, ability to burn the more difficult fuels and a considerable reduction of room draughts.

Such is the story, briefly, and in part, of B. C. U. R. A.'s first five years. There are naturally many other aspects of the Association's work, such as the examination of particular problems for members and for Government Departments and the organization of conferences on particular aspects of coal utilization.

### Many Problems Ahead

So, therefore, in the next five years. with the support of all sections of the community interested in coal and its derivatives - colliery owners, appliance manufacturers, coal by-product manufacturers, manufacturers of steam-raising plant, the mine worker and the housewife, B. C. U. R. A. is planning to undertake research on a much wider scale than previously. It is anticipated that between \$1,000,000 and \$1,200,000 per year will be expended by B. C. U. R. A. on coal research. This research has the promised financial support of H. M. Government through the Department of Industrial and Scientific Research.

As its name implies, B. C. U. R. A. is an association formed to promote research and other scientific work in connection with the utilization of coal and its derivatives. It is the aim, therefore, of B. C. U. R. A. to translate into practice the results of the findings of its research teams. A special department has been set up to make available to industry, by practical application, the results of the work of the scientists and engineers, so that all will ultimately benefit from the work.

### THE ELECTRON TUBE—Genie, Gremlin or Jeep?

A description of the fundamental principles of one of industry's newest aids

By W. D. COCKRELL

Engineer, Electronics Section In-Justrial Control Division General Electric Company

THE average industrial engineer, unfamiliar with electronics who glances through almost any magazine today, technical or popular, is apt to be overawed by the promises of electronic things to come. It is quite likely that his first impression will be that the electron tube is nothing short of a genie straight out of the Arabian Nights—a superhuman spirit of fantastic complexity and far too elusive for the average mortal to comprehend.

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Or he may take the opposite viewpoint. These odd looking electron tubes must fit into a class with the gremlins, mischievous little sprites capable of much good but more evil, and definitely to be shunned for as long a period as possible.

But on closer acquaintance this electron "monster" loses most of its frightfulness and turns out to be a friendly little jeep, rugged and reliable, capable of taking a terrific beating with minimum attention while do-

ing a man-size job.

Like the jeep, the electron tube can do its job 100 percent, but it cannot win the war unless the rest of the army pitches in to do its share. The rest of the "army" consists of the infantry of rheostats, transformers, and capacitors; the artillery of motors, generators, and amplidynes—all old friends, but perhaps not quite so quickly recognized under the speeded-up operations of this new mechanized

So let's all be good sports and not be too quick to condemn this electron "jeep" if the whole show does not come off as scheduled. Perhaps the break occurred at an entirely different part of the front. Did you ever shoot trouble for an hour and then find a blown fuse? That has happened on electronic panels, also!

### What are Electron Tubes Anyway?

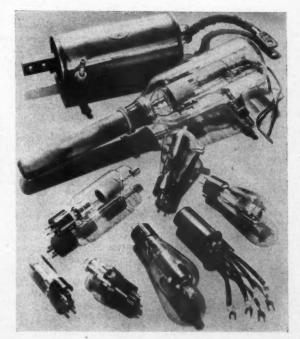
Are tubes hard to understand? Anyone who understands the use of the simplest copper-oxide rectifier, the rheostat, and the direct-current voltmeter, can become a tube expert after one easy lesson—anyway he'll know as much about an electron tube and how it functions in an industrial circuit as many of us need to know.

In the first place every true electron tube is a rectifier—composed of at least two elements or electrodes enclosed in a vacuum envelope made either of glass or of metal. One of the two principal elements of each tube is called a "cathode." The cathode is made of special materials and is heated, usually by a small electric heater, to release electrons—those fundamental particles of negative electric current.

Once in the dim dark past of highschool physics, we learned that anything charged positively attracts a negative charge. In the next lesson we learned that if the charge is negative, other negative charges are repelled. Thus, if we connect the other principal tube element called the "anode," to a power source so that it is positive with respect to the cathode, the anode will attract the electrons from the cathode. But if conditions are reversed and the cathode is positive and the anode negative, no electron flow will take place because the anode is so made that it will prevent the loss of electrons. Thus we get the one-way valve action of rectification; the electron flow (or the negative current flow, if you like to think of the normal current flowing from positive to negative) can move in but one direction through the tubenamely, from cathode to anode.

But that is not all. In these days of commando tactics, we are taught that it is most effective to kick a guy when he is off balance, or sock him when he is not looking. In a similar manner if we can catch the current passing from cathode to anode in its

Hindustrial electronic tubes are of many types. Included here are: ignitron, pliotron, kenotron, thyratron, phanotron and photo-tube



simplest state, as a stream of electrons, we can control it with the greatest of ease. For instance the electrons in an ampere-second of current weigh about a billionth of an ounce, something a lot easier to push around with a small control power than even the smallest and lightest switch or contactor. The control ele-ment added to the electron tube for this purpose is called a "grid," which is usually a spiral or grate of fine wires placed between the cathode and the anode. If the grid is held at a negative potential with respect to the cathode, it tends to repel the electrons passing by it on their way to the anode, thus cutting down the flow of current or possibly preventing it altogether. So long as the grid is negative it pushes the negative electrons away, and thus collects no electrons to itself. No electrons means no current and no current-even with a large impressed voltage—means no power. And to be able to control current without the use of power is a neat job!

Of course if we make the grid positive, it will assist the flow of electrons to the anode and a larger current will flow, but only at the expense of some electron current to the grid. With the grid negative we can have control power for next to nothing.

### Types of Tubes

The electron tubes that are used in industry may be divided roughly into three groups: phototubes, high-vacuum tubes, and gas-filled tubes.

Phototubes. A phototube is rather unique. It is a simple two-element rectifier in an evacuated glass bulb. The cathode is not heated to release the electrons, but is made of material which releases or "emits" electrons as light strikes it. These electrons can then be attracted as a small negative electric current to the positive anode. You might have guessed that the number of electrons which should be kicked out of the cathode material when light strikes a small cathode would not be very large; you would be quite right. We are lucky to get a millionth of an ampere in most cases; and under certain conditions the current is much less. In fact the output is so small that in order to make use of it we must boost it up or amplify it with a pliotron or thyratron, in order to operate even the smallest practical relay or motor.

Phototubes are the "electric eyes" of industry. Responding to a shadow or a flash of light, they may be used to count people, food, freshly painted articles, and other things which it is not desirable to touch, as well as to perform many other simple switching applications. In more advanced equipments, they can check or compare

colors, read high temperatures, and control very rapid and accurate movements through the weightless and wearless light beams. The potential uses of the phototube are limited only by man's imagination.

High-Vacuum Tubes: Vacuum tubes which are simple rectifiers and which have but two principal elements-the electron-emitting cathode and the collecting anode—are called kenotrons, or "diodes" ("di," indicating "two"). If we add one grid for the control of the electron stream, it becomes a "triode." All high-vacuum tubes with one or more grids are called pliotrons, or simply amplifier tubes. Sometimes they are referred to by their function, such as transmitters, oscillators, or converters. If more grids are added in the electron stream to control the flow, as series valves in a pipe, the tubes may be called tetrodes (fourelement, two-grid), pentodes (fiveelement, three-grid), etc. The typical vacuum tube is a low-current device which has a comparatively high voltage drop within the tube, yet it is capable of extremely fast and continuous control of the current with minimum grid power.

The pliotron is the familiar tube in radio receiving sets. Its role of amplifying a small signal or supplying a small output power is just as useful in industrial devices. Because of its characteristic of continuous control at extremely high frequencies, it is used in the larger sizes to supply the many kilowatts of power required for large broadcasting stations, or for induction and dielectric heating.

### Gas-Filled Tubes

Gas-filled tubes, if used as rectifiers only, are called phanotrons; if they contain control elements they are called thyratrons or ignitrons.

Thyratrons. A thryatron tube has a hot cathode to emit the necessary electrons, and a grid to prevent current flow when desired. However, it also contains mercury vapor, obtained from a drop or two of mercury in the tube, or it may contain inert gas such as argon or xenon at low pressure. The gas or vapor helps to cut down the high internal voltage drop found in the pliotron. A constant voltage drop of about 15 volts is held for any value of current within the ability of the cathode to supply electrons. (This is done by a process called ionization.)

Because of this low drop, a thyratron of a particular size can be rated for a continuous current of 10 to 20 times that of a pliotron of the same physical size. Thyratron current ratings run into amperes; most of the pliotrons with which we deal will carry continuously only a few milliamperes.

But gas filling does have a few

drawbacks. For instance, the maximum voltage of the controlled circuit is limited, but it is still well above the usual industrial control voltage range. Of more importance to us is the fact that the gas prevents the grid from controlling the current after the flow has once begun. In other words, a negative grid will prevent the flow of current as the anode is made positive; but once it has permitted the electron arc to start, it is powerless to stop it. The current can then stop only as the anode power is removed, or in any a-c circuit, during the a-c voltage negative cycle. Even then the deionization time required to regain control may be approximately a millisecond; therefore thyratrons do not operate at frequencies much greater than the commercial power frequen-

The thyratron is the handy-man of the industrial tubes. It controls motors, energizes magnetic contactors, and supplies small amounts of heat whenever accurate control or high-speed operations are required. Operating indirectly by controlling generator fields or saturable reactors, it can control large amounts of power—many hundred horsepower or many kilowatts—for heat or lighting.

Ignitrons. The ignitron tube is similar to the thyratron in that it is a gas-filled tube, but it differs in that its cathode is not heated to free the electrons. Instead, its cathode is a pool of mercury and its electron-emitting energy is derived from the arc stream itself. This is a cumulative action-the larger the current the more electrons are made available. Thus the instantaneous current capacity of the ignitron is limited only by the size of the elements and the leads to carry the heavy current. This may be thousands of amperes. The continuous current rating is determined by the ability of the tube to dissipate the heat losses. The larger sizes of ignitrons have built-in water jackets through which cooling water is circulated.

Since the ignitron, unlike the thyratron, does not have electrons immediately available at a hot cathode, its control element, the "igniter"—a pointed piece of crystal dipping into the mercury pool—must actually "blast" a few electrons loose from the mercury to start the arc stream. This requires real power, as much as 40 amperes to 200 volts for a few microseconds. So it can be seen why the ignitron is most practical for high currents and large power requirements.

Ignitrons are the heavy artillery of the industrial tubes. They are called upon to control the thousands of amperes required for resistance welding. They rectify and control the large amounts of power needed for the manufacture of aluminum, in electrochemical processes, and for steel mill and fastory direct-current shop voltages. They are becoming prominent also in underground mining sub-stations.

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To sum up briefly, the phototube, using the energy of light to release electrons from its cathode, has so small an output in microamperes that a pliotron or thyratron must be used to amplify it to a useful value. The output of the pliotron (milliamperes) is sufficient to operate small relays, or to control a thyratron. Thyratrons, in turn, control amperes to operate large contactors, or motors in the usual control sizes from fractional horsepower up to 5 horsepower or more, or to control ignitrons. Ignitrons can handle hundreds of ambut require a reasonable amount of control power for operation.

### How the Tubes Work

We said before that anyone who can understand a rectifier, a rheostat, and a voltmeter can understand tubes. Now we will prove it!

Take any kind of rectifier-copperoxide or selenium-anything that will pass current in one direction and stop it in the other. Connect a rheostat in series and drive it by a voltmeter element, the positive terminal of which is connected to the negative terminal of the rheostat. Gear the rheostat to the voltmeter element in such a way that more negative voltage will cut in more resistance (see Fig. 1). The rheostat is stepless, and goes to infinite resistance or open circuit at the high end. It is assumed that the voltmeter and rheostat can move extremely fast, 100,000,000 times per second; and the voltmeter is of extremely high resistance, perhaps a megohm or more.

This simple circuit can be used to replace a triode pliotron in any industrial circuit, and will do exactly the same job. If the tube is a tetrode or pentrode, other series rheostatvol: meter combinations may replace each grid. Nothing particularly tough about this circuit, is there?

Would you like a phototube? Then simply replace the voltmeter with an exposure meter so that increased light on the sensitive surface will move the meter element to cut resistance out of the rheostat (see Fig. 2).

As for the thyratron and ignitron, they are no more complicated. In series with the rectifier we'll place a battery of about 15 volts and so connect it that it will be charged by the current which the rectifier permits to pass. (This corresponds to the constant arc drop of the thyratron for all current values.) Finally, in the circuit is a series relay that is connected to "seal-in" or "lock-in," when

PLIOTRON EQUIVALENT CIRCUIT ELECTRONS FLOW ELECTRONS ONLY IN THIS LOAD LOAD FLOW ONLY IN THIS DIRECTION. DIRECTION. ANODE RECTIFIER GRID POWER POWER OLTMETER CATH SUPPLY SUPPLY AC. OR D.C. AC. OR D.C. HEATER RHEOSTAT CONTROL CONTROL VOLTS VOLTS

Fig. 1. Pliotron operation and control. Current is usually in milliamperes

PHOTO TUBE EQUIVALENT CIRCUIT ONLY IN THIS DIRECTION. ELECTRONS FLOW ONLY IN THIS DIRECTION. LOAD LOAD LIGHT LIGHT ANODE RECTIFIER POWER SUPPLY POWER AC. OR DC. CATHODE AC. OR DC. 0 IGHT RHEOSTAT METER

Fig. 2. Phototube operation and control. Light controls a flow of microamperes

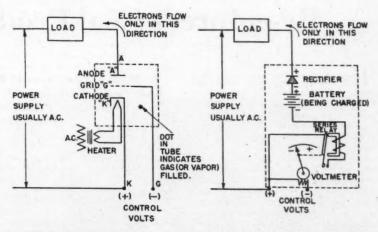


Fig. 3. Thyratron operation and control. Current rating is usually in amperes

the circuit is completed through its own single, normally open contact. The relay armature is moved, and this contact is closed mechanically by the action of the control voltmeter (just as the rheostat turned, in the description of the pliotron). The contact moves to close as the voltage becomes less negative (see Fig. 3).

Once the contact has closed, however, the holding power of the series relay is so great that the small voltmeter torque is powerless to open it (Continued on page 54)



Interest in the sessions was at a high pitch

### 1944 Coal Mine War Conference Re-enforces Coal Production Efforts

THE highly successful 1944 Coal Mine War Conference of the American Mining Congress, with over 1,200 registrations, now goes on the records as the best attended of the wartime meetings of the coal industry. From start to finish all sessions were exceedingly popular. Those who came to listen and learn were rewarded with many an answer to current problems in their own operations, and those who came to talk were greeted with large attentive audiences, numerous questions from the floor and much illuminating discussion.

Important addresses were presented by Donald M. Nelson, chairman, War Production Board; Charles J. Potter, Deputy Solid Fuels Administrator and Deputy Coal Mines Administrator; and Brig. Gen. Hermon F. Safford, chief of Production Service, Office of Chief of Ordnance, U. S. Army. These national leaders, speaking to capacity A. M. C.'s 21st Annual Coal Convention, May 1-2 at Cincinnati, Provides the Answers to Numerous Coal Mine Operating Problems Intensified Through War Production Demands

audiences at the two luncheons and the annual dinner, emphasized the significance of the coal industry in the present war picture.

Led by Charles Dorrance, National War Conference chairman, and Harry Moses, chairman of the Coal Division, the meeting was by all accounts an outstanding success.

### General Session

The general session opened promptly at 10 o'clock Monday morning. Julian D. Conover, secretary of the American Mining Congress, summarized the purpose of the Conference with his opening remarks: "For the third con-

secutive year we are gathering together while our country is at war, to consider how we can do a still better job in meeting our wartime responsibilities and speeding the day of final Victory. \* \* \* In 1943, in the face of repeated suspensions of operation, manpower shortages, unconscionable absenteeism, and Government seizure and operation of the mines, bituminous and anthracite mines boosted production to a new all-time record. With still higher goals set for 1944, and our underground reserves showing the strain of this all-out effort, it is evident that we have a tremendous task before us."

It was in this spirit that the Conference moved forward without letdown in enthusiasm and seriousness for the full two-day period.

Hubert E. Howard, president of the Binkley Coal Co., presided during the general session. He introduced Charles Dorrance, National Program Committee chairman; Harry M. Moses, chairman of the Coal Division; and George E. Stringfellow, chairman of the Manufacturers Division. Howard I. Young, President of the American Mining Congress and WPB deputy vice chairman for Metals and Minerals, was unable to be present at this session but arrived Tuesday to take an active part in the proceedings. Mr. Stringfellow had an excellent chart talk which was deferred to Tuesday afternoon, at which time he presented seven graphs to show "Bituminous Coal Mining in Two Wars." Highly instructive, this talk served graphically to compare our previous wartime abilities and the results appertaining thereto with those of today. It was a compelling picture of the progress that has been made.

Two most excellent papers followed. "Planning for the Future of Coal Mining" was the subject discussed by D. L. McElroy, chief engineer, Consolidation Coal Co. He warned that post-war problems must be anticipated and decisions made to meet those adjustments in all phases of coal mining which will affect every department from coal face to consumer.

After considerable discussion on Mc-Elroy's paper, Charles B. Baton presented a careful analysis of the problems of "Bituminous Research." Noting the ever-increasing competition of other fuels, he pointed out that the advantages of coal must be presented to the public in order to meet this competition. He also indicated the means which research is developing to raise the efficiency of coal combustion methods for industrial, railroad and automatic domestic heating. The discussion following this paper indicated some of the things in store for the future of coal. Thus, the theme of this entire session brought out the value of "looking ahead" in coal mining.

At the Monday luncheon meeting, Harry M. Moses, in his usual affable manner, introduced Charles J. Potter, Deputy Solid Fuels Administrator, who presented an address on the growing difficulties of the coal industry. He noted the production of 589,000,000 tons of bituminous coal in 1943 with a labor force of about 428,000 menan average of 1,370 tons per man, highest of all time. He lauded the producers of coal who somehow continue to produce and even increase production despite reduced forces. He offered no over-all cure for wartime ailments but reemphasized the impor-

tance of six items: (1) Reduction of the tonnage loss which occurs through work stoppages and absenteeism, (2) Best possible safety standards, (3) More vigorous action to secure deferment of key men, (4) More active recruiting and training of new miners, (5) Maximum possible mechanization, and (6) Most efficient utilization of manpower and equipment.

### Monday Afternoon Sessions

The deep mining session on Monday afternoon was presided over by L. C. Campbell with interesting and instructive papers on: "Underground Power Distribution," by C. R. Nailler; "Mine Ventilation," by J. A. Saxe; and "Safety in Coal Mining," by W. D. Cohelia. The constant tendency to advance in these phases of mine operation were not only well emphasized in these fine papers but in the floor discussions as well.

Concurrently, the strip mining session met under the chairmanship of James Hyslop. The papers presented were: "Drilling and Shooting Overburden," by T. H. Latimer, and "Haulage Systems in Strip Mining," by Howard Asbell. This session brought out a great deal of discussion on these highly pertinent matters and led to considerable exchange of advice and ideas among strip mine operators present. Free use of lantern slides and blackboards was resorted to in rounding out discussions during all technical sessions of the Conference.

In discussing the practical problems of power conversion and d.c. power distribution for mechanized mining, Mr. Nailler pointed out that successful mechanized mining depends upon nearly continuous operation of mining, loading and haulage equipment. Correct determination of electrical load centers is highly important and should be maintained as mine operations progress. Portable ignitron stations have proved highly effective and

economical in establishing continuity of power.

Mr. Saxe brought out many interesting problems of modern mine ventilation. Modern systems are required to provide adequate numbers of splits and positive control of air distribution by airlocks, doors, regulators, The stepped-up production from etc. hand to mechanical mining has necessitated many changes to obtain proper amounts of fresh air at the faces. "Going beyond the provisions of the mine law, most responsible mining companies have intended that their mines shall have ample ventilation, safely controlled and distributed in an economic manner. Without exception management believes that effective ventilation is the first line of defense against disaster and essential to the safety and welfare of their workers."

Wartime accidents in mines are doubly serious in that they cause tonnage losses and therefore impose a heavy responsibility on both management and employes. Mr. Cohelia dwelt most earnestly on this all important subject and suggested ways to promote safe practices and thus reduce this source of lost man-hours. He placed considerable emphasis on the training of new men and warned that they must be made familiar with the hazards present and the means of avoiding injury therefrom. He called on foremen and operational executives to impress the idea and substance of "safe" practices thoroughly on the new men while not forgetting that some of the experienced miners also need a little jogging now and then to keep them safe.

### Strip Mining

T. H. Latimer spoke most interestingly on the problems of drilling and shooting overburden in strip mining. The difficulties of blasting in such operations are increasing, he warned,



Registrations surpassed previous wartime meetings

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and proper drilling and blasting will improve efficiency and save equip-ment. "Out of 18 major strip mines in Illinois there are only 5 left still able to operate without shooting at least a portion of their overburden, and some of these are at least in pretty stiff materials. \* \* \* One major problem at every mine, to be faced at least once, and more generally several times, is box cutting, and when rock or hard shale is present proper shooting is the difference between a smooth easy-going operation and untold grief." The discussion following this paper indicated the wide variety of blasting problems which strip miners face in moving overburden.

The advantages of truck haulage where steeper grades decrease haulage distance-and the development from small to large truck units were features of Howard Asbell's instructive paper. Among many other pertinent facts he enumerated: "Available tonnage governs the selection of haulage systems at present more than ever. Many operations of today are on a small scale in which it is imperative we use dump trucks, due to inability to maintain multiple runways and first-class roads. The tonnage involved is not sufficient for an expensive setup." And, "There is, however, a maximum in miles for an economical truck haul, 5 to 6 miles is the limit, governed by the contour of the land and unit capacity."

While the afternoon technical sessions were in progress the Manufacturers Division met to hear two timely talks: on policies and procedures in the pricing of mining equipment, by Walter Shoemaker, of OPA's Machinery Branch, and on present-day problems in the "scheduling" of deliveries, by WPB's Mining Division Director, Arthur S. Knoizen, Julian D. Conover presented a report of the Mining Congress' work of particular interest to the manufacturers. At the meeting of the Board of Governors the following officers of the Manufacturers Division were elected: H. V. Brown, of Brown-Fayro Co., chairman; Thomas McNally, of McNally-Pittsburg Mfg. Co., first vice chairman; R. H. Pearson, Gardner-Denver Co., second vice chairman; J. J. Huether, General Electric Co., third vice chairman. George Stringfellow, of Thomas A. Edison, Inc., retired as chairman. New board members are: P. F. Bauer, Allis-Chalmers Mfg. Co.; J. H. Sanford, Ohio Brass Co.; John T. Ryan, Jr., Mine Safety Appliances Co.; and A. E. Pickard, Tamping Bag Co.

### Tuesday Morning Sessions

Two deep mining sessions proceeded on Tuesday morning with the same degree of interest as that shown during the Monday sessions. Session "A," presided over by C. A. Gibbons,

covered some important conservation problems: "Conservation of Fuel," by H. F. Hebley; "Froth Flotation of Anthracite Silt," by W. J. Parton; and "Complete Seam vs. Selective Mining," by J. W. Woomer. Session "B," under the chairmanship of A. K. Hert, brought forth excellent discussion on: "An Unsolved Problem of Thin Vein Mining, by L. E. Young; "Handling Rock in Thin Coal Seams," by Watson Storey; and "Conveyor Mining Under Tender Roof," by T. E. Jenkins. The illustrative material presented by the various authors added notably to these outstanding studies.

A study of the future reserves of coal, oil, and gas with an analysis of what must be done to conserve our fuel supplies was presented in Mr. Hebley's paper. Reflecting on the demands of a global war with reference to fuel shortage he emphasized the need for fuel preparations now for next winter. He pointed to the fact that coal has had to assume the burden formerly carried by oil and gas, now diverted to other uses. The increased industrial demand places additional pressure on coal operations. With coal so important and other fuels so much in demand, no method of fuel conservation must be disregarded or considered lightly.

Mr. Parton presented a very fine paper on "Froth Flotation of Anthra-cite Silt"—a discussion on the clean-ing of fine anthracite. The silt produced as a waste product in the mining and preparation of anthracite must be taken into consideration by all the anthracite producers. Although the market is not yet ready for fine anthracite, the problem of cleaning it must be solved as its potentialities are important. Parton described the conduct of pilot plant tests, showed recovery possibilities and gave estimated Accompanied by a series of well-prepared slides, his talk gave rise to much discussion and pointed the way to a very essential avenue of investigation which may well establish the use of anthracite silt in the future.

A comparison of methods of handling seam impurities in hand mines, mechanical mines and strip mines was made by Mr. Woomer. He discussed methods of bench mining and gave details of the results of complete seam mining as compared to separate slate handling. He re-defined the term selective mining as "the mining of material in a sequence that permits segregation of 'pay' material from 'nonpay' material as the excavation is made." He presented also a series of exhibits to bring out factors involved in varoius individual types of operations in the Pittsburgh seam and drew up his summary with reference to. (1) the mining industry, (2) the manufacturers of face mining equipment, (3) the manufactures of prepa-

ration equipment, (4) the United Mine Workers of America, and (5) the fuel consumer. Each is intimately involved in the matter of clean versus dirty coal.

One of the unsolved problems of thin vein mining was ably discussed by Dr. Young. Such studies provoke much thought and comment and the example chosen by Dr. Young proved no exception. The question was raised as to methods for operating with mechanical loading under severe wet conditions in a thin seam where water in gob areas of an overlying seam drain into this lower seam. The speaker pointed to the need for better drainage in upper areas, and noted plans and methods considered for combating the difficulties present.

ing the difficulties present.

Watson Storey's paper, "Handling Rock in Thin Coal Seams," dealt with some unavoidable difficulties. His emphasis was on the fact that low-vein mining always involves some rock work either for head room or haulage gradients. He described three methods of taking up bottom, gave full details on equipment used and presented performance data and cost records. He pointed out that the mine operator must accomplish the necessary dead work in thin seam mining as economically as possible."

The Eagle Mine in Weld County, Colo., was described as an example of conveyor mining under extremely tender roof by Mr. Jenkins. Laid out for shaker conveyor and duckbill mining, the mine is subject to several controlling factors. (1) limited local coal reserves necessitate maximum recovery; (2) rapid development was needed at the start to hold existing markets; (3) tender roof prevented sufficiently extensive room opening to employ any other type loading. coal seam is 61/2 to 9 ft. thick and 12 to 18 in. of coal must be left in the roof to provide top support and keep air away from roof shale. If props with cap pieces are placed at about 5 ft. centers, the roof holds well.

At the Tuesday luncheon, H. V. Brown presented Brigadier General Hermon F. Safford who addressed the gathering on numerous aspects of the Army Ordnance program. He compared modern weapons with those of 1918 and especially stressed the importance of careful transport of ordnance to the fighting zones. The speaker answered numerous questions from the floor concerning his exceptionally interesting war job.

### Tuesday Afternoon Sessions

During the afternoon, there were more papers on both deep and strip mining. The concluding deep mining session was conducted by George L. Smith with high calibre papers on "Machine Maintenance" by Thomas L. Garwood; "Shuttle Cars and Loading Machines" by G. Stuart Jenkins; and "Gathering Haulage for Mechanical Loading" by P. R. Paulick. Again illustrations and discussions were most pertinent and illuminating to all present—as can also be said of the concurrent strip-mining session. This latter was led by Chairman R. H. Sherwood with two excellent papers, "Drainage in Open Pit Mining" by Lafe Stewart; and "Time Study and Production Engineering in Strip Coal Mining," by Gene H. Utterback.

Mr. Garwood laid considerable stress on the fact that maintenance of machines has now become even more important than in the past because tonnages must be maintained at peak rates. He described the complete plan of preventive maintenance in use at his operations and outlined organization and methods used for machine repairs, inspection and lubrication, including the work of shop and section crews. He showed forms for daily reports on operating condition of machines and repairs needed for various classes of equipment, and otherwise described a most thoroughgoing plan for complete machine main-

The various features involved in the employment of shuttle cars with loading machines were discussed by G. Stuart Jenkins from his background of a number of years experience with different types of gathering haulage. He showed that service haulage is the most important factor in obtaining efficiency with mobile loading machines. Since shuttle cars have become of important consideration in deep mine operations, his paper was well calculated to stimulate discussion. He especially compared the various types of haulage now in use.

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Mr. Paulick presented an instructive paper on gathering haulage for mechanical loading in which he discussed mechanical loading with mine cars, transfer cars and shuttles. He gave examples of how increased production has resulted from larger car capacities and decreased car change time. "Facts are best obtained from time studies," he said. "Time studies properly made and analyzed will disclose poor operating practices, delays restricting production, and in turn suggest remedies or corrective measures necessary to eliminate the restricting factors."

Drainage problems in open pit mining were described by Lafe Stewart who stressed the importance of careful long-range planning to prevent excessive water handling. He explained the use and value of topographic maps in planning ditches, culverts and levees needed in surface drainage to obviate pumping from the pit. Pit drainage itself requires proper selection and placement of pumps with reference to capacity and

proximity to discharge points. Properly engineered, a pit drainage system provides for freedom from water accumulations at all times with a minimum of pump settings.

Mr. Utterback's paper presented an analysis of the principles of production engineering as applied to strip coal mining. He gave some of the background of time-study and production engineering and pointed out the tremendous strides this field has taken in recent years. By means of examples and analyses he showed how increased tonnage and lowered costs can result from correlating operating data and analyzing the performance of crews and flachines, and then further discussed details and methods of gathering and compiling time studies.

### The Annual Dinner

The Annual Dinner at 7 p. m., Tuesday, provided a fitting climax and finale to a War Conference of real accomplishment. Toastmaster Charles Dorrance introduced special guests, leading coal executives and officials of the American Mining Congress to an overflow audience and then presented Honorable Donald M. Nelson, Chair-

the things that need to be done, and each executive must bring his ideas, his resourcefulness, his experience to bear upon the problem.

"I know that it is not easy to increase the output of any mine under present circumstances. But it can be done. I have found that in dealing with any American industry, it is only necessary to point out the job that has to be done in order to get a prompt constructive result. American resourcefulness and ingenuity have yet to find the production problem that they cannot lick under the stress of an urgent national need.

"Nobody hopes for a big sudden jump in coal production. Such a notion is mere dreaming. What we do hope for is a steady inching progress—a little here and a little there—not by any single idea or action, but by a concerted all-around attack on the problem. A mine will make a little gain—and then its job will be to make that little gain grow bigger. Multiplied by all the coal mines, those little gains could quickly transform the entire coal picture.

"When the full story of your con-



Seated with Donald Nelson are Harry Moses, Chas. R. Hook and Howard Young

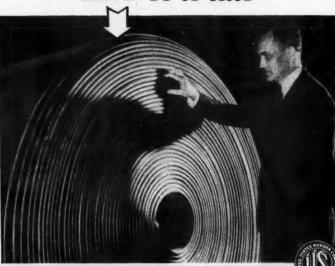
man, War Production Board. Mr. Nelson's address was both timely and thought-provoking. His full appreciation of the tasks before the coal mining operators, executives and manufacturers and his realistic analysis of the contributions which every American citizen must make toward winning the war were reassuring. Following his high praise of the coal industry for the part it is playing in today's allout war effort, he warned that the manpower problem would grow increasingly acute and pointed out the challenge to the industry to maintain production.

"Individually, each mine must do

tribution to the war effort is fully understood by the public, I am certain that the prestige of the coal industry will be enhanced greatly in the public mind, contributing to a bright postwar future for coal. As you throw yourselves into the immediate war job, as you rededicate yourselves to the urgent task of increased war production, you can take satisfaction in knowing that you are making a valuable contribution to the winning of the war. The knowledge gained in these hectic years of war, I feel sure, will prove a mighty asset when victory and the coming of peace throw open the doors of the future."



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### Coal Division Reports

### Maintenance Organization and Maintenance Practices

Reports by the Committee on Mechanical Loading on mines using mobile loaders

Report on Mine A By S. M. CASSIDY

THE mine covered in this report is 100 percent mechanized using trackmounted equipment exclusively, operating three shifts per day, six days per week, with usually two to four machine shifts of slate loading on Sunday and one to four shifts by cutting machines on man-holes, trimming, taking down roof, etc. Each of the three loading shifts has seven loading machine units or a total of 21 loading machine shifts per day of 24 hours; loading approximately 8,000 tons of material. Working sections are 3 to 4 miles from the bottom. The mine is gassy, all face equipment is maintained in a permissible or explosionproof manner, and very strict state mining laws must be complied with in electrical and maintenance matters.

### Underground Equipment

Underground there are 26 locomotives, of which 12 are 8- to 10-ton, explosion-tested, cable type; four are 12-ton, explosion-tested, cable type; the remainder are trolley-type of 6 to 13 tons. There are two extra loading machines, two extra cutting machines and three extra permissible post drills. Two of the gathering-type locomotives and one of the three 13-ton units are spares. In addition, there are two portable, permissible, self-propelled compressors; a hitch drill; approximately 30 gathering pumps, plus six small centrifugals, plus six large main discharge centrifugals; 212 large 8-wheel mine cars; three underground 300 kw. ignitron rectifiers; 14 automatic reclosing circuit breakers and various other miscellaneous equipment. Practically all face equipment is seven years old.

### Maintenance Supervision

At this mine there is a complete division between maintenance underground and outside. The division comes at the rotary dump, which is at the foot of the slope inside the mine. From that point out, including the mine car repair shop, all maintenance is under a master mechanic. Inside of that point all maintenance, both electrical and mechanical and overhauling, is under a chief electrician. This split is desirable because of the qualifications and personalities of the two men involved; both are expert in their respective fields, but neither would be at all qualified in the field of the other. Under the state law the chief electrician in charge of each shift is equally responsible with the mine foreman for the condition of all electric lines and

The chief electrician is present at the start of the first, or day shift and also receives the reports at the end of the first and lines up the maintenance men at the beginning of the second shift. Under the chief electrician is an assistant chief electrician who starts work at 7 p. m. and overlaps the second and third shifts. Their crews on each shift are divided into three main parts, viz: Main shop, section shop and overhaul shop.

### **Underground Section Shop**

The section shop is located back in the mine at a central point with reference to the seven separate loading machine sections. This shop consists of a gunited entry about 400 ft. long, with five stalls on each side, two of which have concrete repair pits and overhead cranes. There is an additional small room for oil and grease and a larger room where a few constantly needed parts are kept.

Three men each shift work in and out of this shop; there are no mechanics whatever in the sections and

these men only go into the section on a breakdown. They have the use of two trolley-type locomotives which have special bins and racks on top for storage of small parts, such as hydraulic hose, chain fittings, tools, etc., which are usually needed when they make a call in the section. In addition, they also have a special car fitted with oxy-acetylene equipment and a d.c. driven motor-generator welding set. One of these men is rated as the leader at more wages than the other two.

As much as possible, they keep in the shop one spare loader, cutter, drill and gathering locomotive in first-class condition. As all equipment is trackmounted, and as this shop is in the heart of the sections, if there is breakdown of any consequence, the mechanics will swap a machine and make the repairs in this shop rather than in the section.

### Lubrication

One special greaser starts his shift at 7 a. m. and another at 7 p. m. These men are rated as second class mechanics and do all the special greasing of transmission and gear cases and, in addition, replace all grease fitings and hose that they may find needed on the cutting and loading machines. The lubrication, otherwise, is done entirely by the loading and cutting machine operators and drillers who have only one kind of grease, and one kind of oil to use. The greasers report on how well the equipment is being lubricated by the operators.

Lubricants for all three shifts are delivered to each section, as well as to shops, by a supply crew with a special truck on the day shift who fill the hydraulic oil cans on the rack at the tool station of each section, and supply the so-called "filler" cans with grease, from which the operators fill their guns as needed. This special supply crew also delivers repair parts to the two shops and handle all supplies used in the mine, with the exception of heavy material such as timbering and track, which is handled by other crews on the second and third shifts.

### Underground Main Shop

The chief electrician has his office, in which he keeps all records, at the main shop which is near the slope bottom. This shop is a large brick and gunite room approximately 20 ft. wide by 100 ft. long and has two concrete repair pits, each of which is capable of holding two units of machinery. This is the main machine shop of the entire mine and is fitted for all sorts of maintenance work, and major repairs as well as rebuilding and even making of parts, as necessary. The equipment includes a motorized traveling crane over the entire shop, lathes of different sizes, a shaper, miller, drill presses, hydraulic presses, metallizing equipment, special equipment for testing drills, special equipment for testing hydraulic apparatus, and all other items necessary for a quite complete maintenance shop. In a separate room is a special electrician's shop for overhauling panel boards, etc., and another special room has an air compressor and three electric arc welders. Throughout the shop are taps for air, welding, d.c. current and both 110 and 440 volts a.c. current.

The work in this shop is on a threeshift basis and one man on each shift it designated as the shop leader under the chief electrician. There is almost an equal division on each shift of machinists, mechanics, electricians and welders. However, one man on the day shift is a special pump mechanic and electrician who devotes his entire time to checking the pumps in the mine and rebuilding spares. This system has resulted in a marked improvement in pump maintenance, which was quite troublesome a number of years ago due to the fact that many of the 42 pumps were 20 to 30 years old. One mechanic is a specialist on hydraulic equipment; another is a specialist on rewiring control equipment from loaders, cutters and locomotives; another is a specialist on drills; others are more or less general men who overhaul machines.

On the day shift there is also one man who devotes a part of his time to keeping records for the chief electrician; to ordering parts and keeping the stock of the storeroom in order. On the second and third shifts this is done by one designated man on each crew who works on other jobs and only opens up the locked storeroom when needed.

### Overhaul Shop

Recently a new shop was fitted up on the outside of the mine as an overhaul shop under the jurisdiction of the chief electrician. Three men work in this shop, one of whom is the leader, one a mechanic and one a general laborer with ambition to be a mechanic. The purpose of this shop is

to thoroughly tear down and rebuild loading and cutting machines one by one so that when it goes back into service it will be equal to or better than a new machine. This type of maintenance was originally attempted in the main shop underground, but it was found that where repairs, as well as overhaul work was going on, there was a tendency to drop the overhaul work and to concentrate on fixing up equipment that was in the shop for major repairs.

As stated, the mine has two spare units in each category of the major equipment; one of the spares is for swapping in case of a breakdown and the other is to permit thorough overhauling as needed in the main shop. There has been no set time to overhaul each unit completely at a fixed period of service, but major parts of machines are overhauled at intervals determined by experience to be best. For instance, on a loading machine the overhaul and rebuilding period for the rear conveyor and boom might be entirely different from the loading end which, in turn, would be different still from the equipment on the main chassis.

### Daily Reports

At the end of each shift each operator of machinery reports over the telephone before he leaves the section whether or not his equipment needs any work done. These reports are noted on a special repair form and are the basis upon which the chief electrician lines up the first jobs of the three men in the section shop at the beginning of the oncoming shift. These verbal reports are supplemented by written reports made out by each foreman covering all his equipment but as the written reports are not received by the chief electrician until 45 minutes after the next shift has already started the telephoned reports are quite necessary.

All maintenance men make out a simple report showing the major

breakdown of the work they do each shift. This enables the chief electrician to keep tab of work done and other data on the machines.

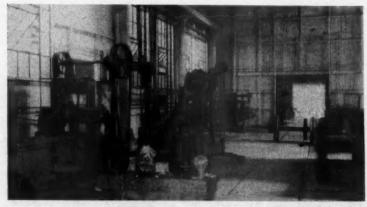
### **General Maintenance Practices**

All of the maintenance men are staggered through the week so that practically all of them work on their respective shift on Sunday. Each maintenance crew always stays at the same turn as rotation of shifts by maintenance men was found very undesirable.

When trailing cables have six splices, they are taken out of service and the splices are then remade and vulcanized; all cables are two or three conductor, due to permissible requirements. No attempt is made to rewind armatures, or do other major armature work at the mine, so this is sent to commercial shops specializing in that work. When the main shop gets overloaded on rebuilding and turning down locomotive, loading and cutting machine tires and wheels, these are also sent to commercial shops for rebuilding.

The engineering department at the mine is quite often called upon by the maintenance department to make designs and drawings of new parts, or changes in old parts; or of standards which are to be adopted. As most of the mining equipment and all the other equipment is seven years or older, there have, naturally, been many improvements developed at the mine; all of which it is necessary to cover by drawings so as to keep them standard.

In the mine, at strategic points, are three, 300 kw. portable ignitron rectifier sets and 14 automatic reclosing circuit breakers, on d.c. lines. The maintenance of all this equipment is done on Sundays only by three men, each of whom is responsible for one rectifier and certain circuit breakers. On a printed form is listed a series of points to check, all of which cover the instruments quite thoroughly. This



A modern shop for mining machinery repairs

thorough weekly check-up by the same man results in practically no trouble from the rectifiers or automatic circuit breakers.

Similar check-ups and records on printed forms are made every week on each piece of explosion-tested face equipment, mainly from an electrical viewpoint. Similar records are kept on other pieces of equipment, as they are checked one by one. This enables the chief electrician to know at all times when each item of equipment was checked, and brings to his attention needed changes and rebuilding that he might not otherwise personally know about.

### Wiring and Bonding

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The mine wire crew works under the direction of the mine foreman as to where wire is to be hung in development work, or taken down in rib work, but under the chief electrician as to methods and standards of work. This actually means that the mine foreman and his assistants direct only the routine wiring work, as the need for it develops, and that all maintenance, grounding, main line work and methods come under the chief electrician. The wire crew is under the direction of a working leader; this leader and four men work on the day shift, and in addition there is one man on each of the second and third shifts. These latter two men are available in case of emergency wiring work, but normally do regular stringing and recovery of wire, bonding, etc.

The wire crew has the services of a trolley locomotive specially fitted with bins and compartments to hold their tools, wire fittings, bonds, etc., and they also have a special reel truck with standards to hold reels of three different sizes of wire at once in a position suitable for ready reeling or unreeling. This crew also has a storage room in the center of the working territories where they can keep their extra parts, reels, etc., and also store their locomotive under lock and key. Ordinarily, however, the locomotive is passed from one shift to the other, so is seldom stored.

### Report on Mine B By J. F. MAZZA

HIS report covers a 100 percent mechanized mine using track-mounted equipment exclusively, operating three shifts per day, six days per week, working a seam 70 in. thick, made up of 42 in. bottom coal, 10 in. of binder and 18 in. top coal. The top is cut with a single bar machine and the middle binder is cut with a double bar machine. A total of 29 loading machine shifts per day, six days per week, produce approximately 5,300 tons of material.

Working sections are approximately 6 to 7 miles from the drift mouth. The mine is gaseous. All face equipment is maintained in a permissible or explosion proof manner and very strict state mining laws must be complied with in electrical and maintenance matters.

### Underground Equipment

Production sections have two equal loading shifts with four loading machine units on each shift; development sections have three equal loading shifts with seven loading machine units on each shift.

In addition to the loading and cutting machines for the 11 operating units, there are two extra cutting machines, one track-mounted permissible drill and one 6-ton reel locomotive, extra. The haulage equipment consists of 24 6-ton locomotives, four 8ton, three 13-ton, four 10-ton, three 20-ton, three 25-ton, and one 20-ton tandem. Other equipment is as follows: five track-mounted permissible coal drills, eight permissible postmounted rock drills, 42 gathering pumps, seven small centrifugals and four large discharge pumps delivering water to the outside, four air compressors, nine jackhammers and 1,100 steel mine cars.

### Maintenance Organization

There is a complete diversion between the inside and outside maintenance. The outside maintenance is under the outside foreman who has charge of the tipple, cleaning plant, coke plant, and mine car repairs. The inside maintenance is under the maintenance supervisor who has charge of all electrical and mechanical equipment. Under the maintenance supervisor is the chief electrician and both work the day shift and are subject to calls at all times. They are salaried company men. A key mechanic on the second and third shifts is in charge of the shop and section maintenance, on an hourly rate of pay.

### **Underground Shop**

This shop is located midway between the face and the outside and is 150 ft. long, 40 ft. wide, with rooms connecting, such as supply and office room combined, oil room, compressor room and large tool room. There are two repair pits and an overhead electric crane.

General repairing of equipment is done here. There are four mechanics working in and out of this shop on the day shift; that is, if a mechanic is needed in any particular section, he takes a repairmen's motor with necessary parts to make the repairs and goes to the designated section. Two mechanics take care of this work on each shift.

### Outside Central Shop

A central repair shop services several other mines of the company. This shop is 150 ft. long, 60 ft. wide, and 3 stories high. All rebuilding, armature winding, coil winding, lathe and foundry work is done here.

### Lubrication and Minor Repairs

On the day shift in development sections only, three service men completely lubricate and make minor repairs to all equipment. On the two shifts in production sections, four service men on each shift do the lubricating and make minor repairs to all equipment. The shifts of these men are so arranged that they do this work when the equipment is not operating. Lubricants are delivered on all three shifts to oil houses in the sections as well as to the shop.

### Supply House

A modern outside supply house carries a complete line of necessary repair parts for all equipment and there is also an inside supply house where only the most commonly used parts are kept for emergency breakdowns. Rebuilt and assembled parts are also stored here. The outside supply house is under the supervision of the storekeeper, whereas the inside supply house is under the supervisor of maintenance. The supervisor of maintenance has a clerk who is responsible for keeping an adequate supply of parts in stock and he also keeps all maintenance records.

### Records

A separate record is kept of all labor and supplies used on each loading machine, cutting machine and locomo-These records determine when a machine is in need of a complete overhauling or rebuilding, at the central repair shop.

### Inspection of Daily Reports

Each mechanic and serviceman reports at the end of the shift, just what he did during the shift, such as the equipment worked on, nature of repairs, and material and labor used to do the job. If any equipment was inspected during the shift, its condition is noted on the report. This is a written report and is given to the supervisor of maintenance daily with the maintenance men time slips. The company allows these men 10 minutes each per shift for making out this report.

The assistant foreman reports to the supervisor of maintenance any equip-ment that is in need of immediate attention. Through close inspection by the operators, assistants, mechanics, servicemen, and supervisor of maintenance, outages have been re-

duced to a minimum.

# Wheels of Government

As Viewed by A. W. Dickinson of the American Mining Congress

RECONVENING from the brief Easter recess, the Congress on April 12 trimmed sail and set its legislative sights to pass necessary bills by late June, when a series of recesses are planned for the party conventions and for what is expected to become a hot political campaign for every individual involved. Apparently undismayed by the bitter and probably inevitable struggle in the Senate over the antipoll tax bill, both upper and lower Houses are expediting their cleanup program, including the "G.I. Bill of Rights," seven departmental appropriation bills, contract termination, tax simplification, and extension of the lend-lease and the price and wage control acts.

### Tax Simplification

Written by the Committee on Ways and Means without recourse to hearings and given House approval May 5, the individual income tax simplification bill, after a rapid treatment by the Senate Committee on Finance, is expected to go to the White House for approval perhaps by the end of May or at least as soon as the anti-poll tax battle in the Senate will permit. Effective next January 1, the bill makes the filing of returns unnecessary for the great majority of wage and salary employes with incomes up to \$5,000, and would collect approximately the amount of tax due through withholding by the employer. Taxpayers with higher incomes would still be required to make quarterly estimates and advance payments, but the date for the final estimate is advanced from December 15 to January 15. It is stated by those associated with the development of the bill that the new withholding tables to be used by employers are simpler and more useable because of the new exemptions at the rate of \$500 for the taxpayer, \$500 for the spouse and \$500 for each dependent. On the other hand, if withholding is computed on a percentage basis \*\*\*\*\*

### Washington Highlights

SUMMER RECESS: Congress steaming up to get away.

INCOME TAX: Simplification for individuals speeded.

WAR CONTRACTS: Senate approves terminations bill.

SURPLUS MATERIALS: No Congressional action yet.

STOCKPILING: Legislation bogged down.

RENEGOTIATION: Departmental control board may be tough on repricing.

INTERNATIONAL CURRENCIES:
Thirty-four nations to continue on stabilization work.

MINERAL TARIFFS: State Department urging "trade barrier" cuts.

DEFERMENTS: Look better for miners over 26.

UNDERGROUND TRAVEL IN COAL MINES: President's committee tentatively reports 55.82 minutes

ST. LAWRENCE: Seaway and power project again an issue.

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rather than by use of the tables, the work is considerably more complicated than under existing law. Separate computations must be made for the new 3 percent normal tax, for the first bracket rate of surtax and, where applicable, for the second bracket rate of surtax. In each case the rates of computation are adjusted to allow for the standard deduction of 10 percent or \$500, whichever is lower. Because of the new schedule of exemptions, a new withholding exemption certification will be required of each employe.

Ways and Means Chairman Doughton has been quoted as stating that his committee should proceed as quickly as possible to consideration of the simplification of corporation tax returns and there is a possibility that after study by the congressional advisory staff during the summer months, there may be some action on such a bill in the fall. On this subject, however, Senator George has stated that enactment of a corporation tax simplification measure seems to be too intricate a task for the Congress to attempt in the present year.

### Demobilization Action

As forecast last month, the Congress is moving rapidly toward enactment of a contract termination law, with re-employment of veterans and civilians and the disposal of surplus commodities remaining for action at a later date. A unanimous vote in the Senate on May 4 sent to the House the revised version of S. 1718, known as the George-Murray war contract This measure, as termination bill. recommended by Senator George's Committee on Post-War Economic Policy and Planning and approved by the Senate Committee on Military Affairs, specifies that the Federal agencies which made the original contracts shall negotiate and administer the terminations. After final settlement audits are to be made by the General Accounting Office but this checking is limited to determining (1) whether payments were made in accord with settlements, and (2) whether fraud appears from the records submitted.

On the House side, both the Military Affairs Committee, which now has the Senate-approved bill, and the Naval Affairs Committee have reported bills which are awaiting action of the Committee on Rules. Chairman Andrew Jackson May's Military Affairs Committee is expected to contend vigorously for pre-audit of war contract terminations by the General Accounting Office, but general sentinent in both Houses appears to be against this procedure as entailing de-

lays which would seriously retard reconversion to either war or civilian production.

While the Senate was passing the contract termination bill, Senator Murray, of Montana, gave assurance that Brigadier General Hines will at an early date present his recommendations on the problem of "human demobilization" to the Military Affairs Committee.

Thus far, there is no indication of early action on legislation which would provide sufficient stockpiling of strategic and critical metals and minerals for the future defense of the nation, under which the large volume of these materials which will be available at the end of the war would be frozen against dumping and a repetition of the inevitable depression of markets experienced following the year 1918. The point is being emphasized that war-end stocks of copper, zinc, lead and other strategic metals are not really surplus, and should not be liquidated, but conserved against the needs of a future emergency-a matter which is discussed fully in a paper by Secretary Julian D. Conover, of the American Mining Congress, at pages 30 to 33.

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### Renegotiation Regulation

Released by the War Contract Price Adjustment Board in mid-April were four of the eight planned chapters of the new regulations governing the renegotiation of contracts for fiscal years ending after June 30, 1943. Thus far released are Chapter I, specifying the authority and the organization for renegotiation; Chapter II, outlining procedure; Chapter VII, which includes War Contract Board forms; and Chapter VIII, made up of statutes, orders, joint regulations and directives.

Contained in a discussion of pricing in the Introduction to the Regulations is the statement that "where a mutually satisfactory agreement cannot be concluded with respect to future prices, the repricing statute (Title VIII of the Revenue Act of 1943) specifically authorizes the department to reprice outstanding contracts of both prime and subcontractors with respect to future deliveries." This is interesting as indicating the attitude which the Federal contracting agencies are prepared to take in the administration of the new Title VIII.

### Currency Stabilization

On April 21, Secretary of the Treasury Morgenthau announced agreement by technical experts representing 34 nations on a set of basic principles for an International Monetary Stabilization Fund. Although not binding any government to participate in the Stabilization Fund, the joint statement recommends a total subscription to the fund in the form of gold and

local currencies amounting to around \$8 billion; the fund then to be used under proper safeguards to assist the participating countries in maintaining exchange stability and correcting maladjustments in their balance of payment.

Secretary of State Hull has joined Morgenthau in expressing his approval of the proposed program and members of Congress are expected to take part in the work of the United States delegation at a conference soon to be held.

During consideration of a bill in-troduced by Representative Charles S. Dewey, of Illinois, who was an Assistant Secretary of the Treasury under the Coolidge administration, which proposes to set up a \$500 million revolving fund for international currency stabilization and rehabilitation of distressed nations, a plea was made for international bi-metallism. As an outstanding authority on the subject Francis H. Brownell, chairman of the American Smelting & Refining Company, explained that there is not sufficient monetary gold in the world to cover resumption of the single gold standard. He said that this nation should become the banking center of the world, fixing the price of gold and silver and buying and selling both metals freely.

Mr. Brownell has just published a very interesting 35-page statement entitled "Hard Money" in which, after discussing the use of gold and silver in the monetary systems of the world, he analyses the inevitable post-war problems of currency and exchange. Speaking of the insufficiency of gold which forced nations off the gold standard, he states that "today there is no nation on the gold standard in any actual true sense, nor has there been for nearly ten years. The breakdown of the gold standard is complete. And it was not caused by the present World War. It happened before that war began-several years before. The physical insufficiency of gold was the main cause." After emphasizing the importance of again providing for free circulation of gold, Mr. Brownell further urges that now is "the most logical time to correct a mere accident of history" (when England in 1816 chose a gold standard), and to return to a system of international bi-metallism, with prices of both gold and silver stabilized or pegged—thus preventing operation of "Gresham's Law" and providing a monetary metal which will satisfy the needs "of a very large (numerically the larger) part of the world's population in Asia, Africa, Latin America and parts of Central Europe.'

### Post-War Trade

Urging the value of foreign investment programs as an essential means of strengthening our economy here at

home. State Secretary Hull has stated that "among the greatest difficulties (post-war) will be uncertainties as to stability of currencies and as to the flow of international investment for post-war reconstruction and development. . . . Without solving these problems, we shall be immensely handicapped in seeing an expansion of our foreign trade and balanced prosperity for our nation." Supplementing the expressions of his chief, Director of the Office of Economic Affairs Harry C. Hawkins has recently declared that the reciprocal trade agreements program is the most important instrument of our economic foreign policy. Calling for "positive and vigorous action by Government to bring about a reduction of the barriers of trade," Hawkins has sounded the call for attack on the trade barrier problem immediately upon the termination of hostilities "or even earlier if practicable."

From these and other pronouncements, which have issued frequently of late, it must be evident to those engaged in domestic production of minerals and metals that strong pressure is now under way to cut protective tariffs and place many of the mining fields of the nation in competition with the low wages and richer ore bodies of foreign lands.

### Manpower

In early April, the War Manpower Commission's interdepartmental committee reached agreement on possible deferments for 135,000 draft registrants aged 18 through 25 years. Included in this number are 56,000 merchant seamen now trained and on ships, approximately 10,000 coal miners and students in colleges and universities who are deferred pending completion of their school work. State Directors of Selective Service and the Solid Fuels Administrator were authorized to endorse Form 42-A special for coal mining registrants, ages 22 through 25 having three or more years of coal mining experience and working in the following states: Pennsylvania, West Virginia, Virginia, Alabama, Washington, Tennessee, eastern Kentucky, and southern Wyoming; such deferments, however, would be granted for a period not to exceed 90 days after May 1.

Recent comment by Maj. Gen. Lewis B. Hershey, in the course of a three-day session in Washington with state draft directors, indicates a downward revision of Army replacement needs and hence a further easing of the draft pressure on men over 26, with the assurance that men over 30 in essential jobs are unlikely to be called in 1944.

There has been practically no let up in the draft situation at metal mines or at coal mines in other than the eight specified states, the only recourse being appeal on each case to the State Director of Selective Service.

### Coal Wage Pacts

The wage contract submitted by the operators and miners of the anthracite region (discussed last month) was approved by the War Labor Board in early April subject to the okay of Stabilization Director Vinson if further price relief is to be had.

Consideration of the bituminous wage agreement based on the Ickes'-Lewis agreement of November 3, 1943, and submitted by the operators and miners in December is again active in the War Labor Board. The Board is also giving attention to the miners' demand and the operators' request that the \$40 payment for portal-to-portal wage claims prior to November 3, 1943, be made effective immediately. Secretary Ickes joined in asking the Board that prompt authorization of the \$40 payment be granted.

The President's committee on portal-to-portal travel time filed a second progress report on April 12, showing the weighted average of underground travel time in bituminous mines to be 55.82 minutes. The final report is expected to give the travel time of production men proper, who are directly involved in mining coal at the face, and it is of course generally realized that this figure will be somewhat higher than the reported 55.82 minutes.

Meanwhile, in the case brought by the Southern coal producers initiating action in the Federal courts to contest the travel time pay claim of the miners, counsel for the UMWA has requested Supreme Court review of the decision in the Jewell Ridge Coal Company case. In this instance, Federal Judge A. D. Barksdale ruled on January 25 that the coal miners are not entitled to portal-to-portal travel time wages, pointing out the distinct differences in practice and in the history of collective bargaining as between coal mine practice and that of the Alabama iron ore mines.

### Iron Ore and Steel Wages

Steel industry officials beginning April 18 made a strong case before a special War Labor Board panel against the 17-cent per hour wage increase demand of the United Steel Workers. Clinching figures presented by President Ben Fairless, of the U.S. Steel Corporation, show that average weekly earnings have increased more than 50 percent since January, 1941, against a living cost increase of but little over 20 percent. Bethlehem Steel Corporation counsel Chester A. MacLain emphasized that the Stabilization Act of October 2, 1942, contains no authority by which the President can make any change in the gen-

eral policy of stabilizing salaries, wages and prices beyond the September 15, 1942, level. He stressed the fact that the President's authority does not extend beyond the right to make adjustments in wage rates to correct gross inequities which may exist between the pay of various employe classifications.

WLB has created two additional panels for the consideration of the wage disputes not being heard by the original "basic steel" panel. Of particular interest to mining men is one of the new panels preparing to hear the cases of 44 iron ore companies in the Lake Superior region. WLB states that the industry and labor representatives on this iron ore panel will come from among those especially familiar with the industry.

### Again the St. Lawrence Project

Recurrent as the groundhog, the St. Lawrence Waterway and Power Project is active again. The old plea of 1941 that the project was necessary to the prosecution of the war has been dropped and administration advocates, including State Secretary Cordell Hull, War Secretary Stimson and Federal Power Commissioner Leland Olds are urging enactment of the bill introduced by Senator Aiken, of Vermont, as "an important contribution to the country's post-war stability and strength."

Promptly meeting to consider this new move, the National St. Lawrence Project Conference's Executive Committee has informed the public that there is not now, nor will there be economic justification for the power development or the seaway in the postwar years.

Senate Commerce Committee Chairman Bailey, of North Carolina, believes that the St. Lawrence project really involves a treaty between the United States and Canada which would require a two-thirds vote of the Senate for approval. If supported in his views by the Commerce Subcommittee under Senator Overton, of Louisiana, Bailey states that the Aiken bill will be sent to the Senate Committee on Foreign Relations.

### The Electron Tube

(Continued from page 43)

again until the current has stopped flowing.

The ignitron equivalent is about the same, except that we must remember that we are dealing with larger power, and the size of everything becomes larger. In place of the voltmeter we can use a small solenoid. A rectifier in series with the solenoid, to permit current to flow in but one direction, may not be necessary in our electromechanical picture, but it is necessary in the ignitron circuit to prevent injury to the igniter by reverse current, so we'll put it in to make our picture complete (see Fig. 4).

And that completes our one-lesson course on the industrial electron tube. We do admit that a few of the details about as essential as trouser cuffs and pocket flaps, have been omitted. But the fundamental facts are here, and we would like to prove it in this way. If you ever run into a wiring diagram that features one of these mysterious electron tubes that has been worrying you, do this: Before you lose any sleep or even get a vitamin "B" deficiency, just tear off a piece of an old war bond or ration book, paste it neatly over the offending tube symbol and draw thereon the appropriate equivalent symbol in a bold and steady hand. Then go right ahead and forget that electrons exist.

IGNITRON

EQUIVALENT CIRCUIT

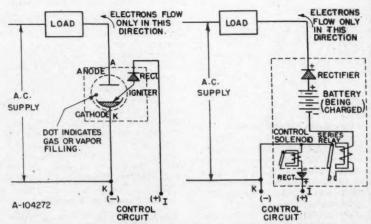


Fig. 4. Ignitron operation and control. Current may be hundreds of amperes

## ERSONALS.

T. P. Billings, assistant general manager of metal mines, U. S. Smelting, Refining and Mining Co., Salt Lake City, has recently been promoted to the position of manager of metal mines for all operations coming under the jurisdiction of the company's Western Division. J. D. Harlan, vice president and general manager of mines, has been appointed vice president and consulting mining engineer of all metal mines and coal operations of the company.

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C. A. Carlson of Price, Utah, formerly state chief coal mines inspector, recently became superintendent for the Spring Canyon Coal Co.

E. B. Winning, manager of the Northern coal mines for Republic Steel Corp., was recently appointed assistant to C. M. White, vice president in charge of operations.

Announcement has been made of the appointment of Keith D. Pfoor, as Deputy Chief of the Coal Section of WPB's Mining Division, succeeding William M. Wheeler, who has resigned to accept a position with the H. C. Frick Coke Co. Mr. Pfoor has been connected with the Mining Division since March, 1942, as a technical advisor on coal priorities.

E. J. Franklin, Chief Mechanical Engineer for Utah Copper Co., and Consulting Power Plant Engineer for Kennecott Copper Corp., has retired after more than 35 years of service. He has been with Utah Copper since construction of the original Magna power plant and has been responsible for much of the electrification of operations, the application of air lift dewatering and the handling of pulp.

Oscar F. Ostby, who has been associated with the Solid Fuels Administration for War and with its predecessor, the Office of Solid Fuels Coordinator for War, since late November, 1942, has resigned to return to his home in New York City.

F. H. Wood, chairman of the Board of Directors and president of the Sahara Coal Co., has resigned. Henry C. Wood is the new chairman of the Board and Frank H. Wood, Jr., has been named president and treasurer.

L. G. Bishop, formerly foreman of the Hull Mine, has been made superintendent of the Coal Valley Mine of the DeBardeleben Coal Corp.

Appointment of George A. Lamb, 38, of Idaho, with a background of Government service and former chief, Economics and Statistics Division, Solid Fuels Administration for War, to a newly created post of assistant director of the Bureau of Mines, is announced by Secretary Ickes. Virtually all activities of the Economics



and Statistics Division of the SFA have now been transferred to the Bureau of Mines.

Lamb will direct coordinating programs of the Bureau and administer the expanded activities of its Economics and Statistics Service which maintains authoritative up-to-date information on all mineral commodities. Hereafter the Bureau of Mines will be responsible for the collection, compilation, and analysis of the bulk of statistical information regarding the coal industry (both bituminous and anthracite) of the United States, including surveys of manpower needs and other war problems and will make such information available to the SFA.

Dr. H. W. Emmons and Dr. C. R. Stauffer will retire from the staff of geology in the University of Minnesota on June 15. Dr. Emmons has been on the staff of the University for 33 years and is head of the Geological Department and Director of the Minnesota Geological Survey. He is well known for numerous books and papers on economic geology. Dr. Stauffer has been on the teaching staff in geology at the University of Minnesota for 30 years and is well known for work in the field of stratigraphy and paleontology.

R. C. Gebhardt, until recently in charge of works with the Alaska Pacific Consolidated Mining Co., operating a lode gold mine on the Willow Creek district at Crooke's Inlet, Alaska, is now with E. J. Longyear Co., as geologist in Tennessee.

Durant Barclay of Coleraine, Minn., has been appointed inspector of ore lands on the Mesabi Iron Range for the Oliver Iron Mining Co.

Edward L. Clark has been appointed Missouri State Geologist to succeed Dr. H. A. Buhler who died recently. Dr. Clark is a former professor of geology at Drury College and a former manager of the Joplin, Mo., WPB office.

The Sullivan Machinery Co., announces the election of J. A. Drain, Jr., to the position of vice president in charge of Product Engineering, Research and Development. Mr. Drain was formerly assistant to the president, and prior to joining the Sullivan Co., was president of the Stefco Steel Co.

The election of O. J. Neslage to the position of vice president in charge of sales in the United States and Mexico is also announced. Neslage during the past year was general sales manager.

Dave Pickett, until recently superintendent at Blocton No. 9 mine of the Black Diamond Coal and Mining Co., has been transferred to the Getmore Mine at Blue Creek. He succeeds B. West, who has resigned. Herman Shamblin has been made superintendent of the Blocton No. 9. Other changes in Black Diamond Coal & Mining Co. personnel include W. D. Patterson, foreman at the New Diamond No. 1 mine, George Byram, foreman at the Sumpter mine, J. H. Holsonback, foreman at Adger.

Edmund D. Wingfield has been elected assistant secretary of Freeport Sulphur Company by the Board of Directors, according to Langbourne M. Williams, Jr., president. Earl K. Nixon has been made manager of Western Exploration of Freeport Sulphur Company to succeed David St. Clair who was transferred to the company's headquarters in New York.

Mr. Williams further announced that headquarters for the Exploration Department of the Western District will be moved from Spokane, Wash., to San Francisco, Calif.

Platt C. Benedict, deputy director of the WPB Zinc Division has resigned to resume his duties as geologist with the Newmont Mining Co. Tom C. Foster, Arizona state mining inspector since 1923, will retire from the post after service of 21 years. A pioneer of western mining, Foster worked at Cripple Creek, Colo., Butte, Mont., and Bisbee, Ariz., in early days, and in numerous other boom camps of the west before settling to his Arizona post as mine inspector. He served as a legislator from Cochise county prior to his election in 1923 to the office he has held continually since that time. He has announced his intention not to seek re-election again due to ill health, and will reside in Phoenix.

Fritz Nyman is acting general superintendent of the Utah Fuel Co., in Carbon County, Utah. W. B. Bryson, formerly manager of mines, has resigned.

J. A. Norden has resigned as general manager, Vermont Copper Co., and has assumed connections with Colonial Mica Co., with headquarters at Middletown, Conn.

Wallace Johnson was recently appointed general sales manager of the Joshua Hendy Iron Works at Sunnyvale, Calif., according to an announcement from Charles E. Moore, president of Hendy, with whom Johnson has been associated for a number of years. Mr. Johnson joined the Hendy organization in November, 1942.

Lawrence B. Wright, consulting mining geologist, has resumed individual consulting practice and is continuing his office at 206 Sansome Street, San Francisco 4, Calif., with Arthur O. Hall, mining engineer, an associate since 1935.

Robert S. Archer has joined the Climax Molybdenum Co., as metallurgical assistant to the vice president. In 1930 he become Director of Metallurgy for the A. O. Smith Corp., of Milwaukee, Wis. In 1934 he was appointed Chief Metallurgist of the Chicago District of the Republic Steel Corp., a position he held up to the present.

H. W. Stiner, a consulting electrical engineer of Cleveland, Ohio, who has been active throughout Ohio, West Virginia and Western Pennsylvania, recently joined the organization of Peter F. Loftus, consulting engineer of Pittsburgh, Pa.

Howard Oster is now general superintendent, Puritan Coal Corp., Puritan Mines, W. Va. He was formerly an inspector for the U. S. Bureau of Mines.

Dr. Willis R. Whitney, honorary vice president of the General Electric Co., and first director of its research laboratory, has been made an honorary member of the Electrochemical Society. A charter member of the organization and its president in 1912, Dr. Whitney was awarded the certificate of honorary membership from the society's president, Dr. Robert M. Burns, on April 14, during the organization's meeting in Milwaukee.

John Kozek was recently promoted to the position of superintendent of the Nokomis Coal Co., Nokomis, Ill.

Joseph F. O'Brien has been appointed assistant to the president in charge of operations, Vulcan Iron Works and Ralph O. Smith, formerly in charge of mine machinery sales appointed general sales manager. F. A. Stead, formerly vice president in charge of sales, and F. M. Kern, formerly vice president in charge of operations, have resigned.

R. D. Thompson is the new outside superintendent for the Rachel Mine, Jones Colliers, Inc., Rachel, W. Va. E. A. Llewellyn has been named purchasing agent.

Robert E. Crockett, well known authority on ore beneficiation and of wide consulting experience, has associated himself with H. A. Brassert & Co., consulting engineers to the iron and steel and affiliated industries. Crockett has been chairman for the past six years of the Eastern Magnetite Mining and Milling Committee of the American Institute of Mining and Metallurgical Engineers, and has been in active charge for many years of ore mining properties and concentrating plants in the East.

Irving S. Olds, Chairman of the Board, United States Steel Corp., announced on March 28 that Cason Jewell Callaway of Hamilton, Ga., had been elected a director of the corporation to fill the vacancy created by the death last year of James A. Farrell.

Dennis J. Keenan, Pennsylvania state mine inspector, was recently elected president of the Pennsylvania Fifteenth District Mining Institute.

Portable Lamp & Equipment Co., of Pittsburgh, Pa., has appointed Abner Bushnell Service Engineer, with head-quarters at Harlan, Ky. Mr. Bushnell was formerly with R. C. Tway Coal Co., Williamson, W. Va., and more recently with the Kentucky Mine Supply Co.

### — Obituaries —

Thomas O. McGrath, 61, well known Arizona mining expert, died March 29. He had lived in the state 38 years and for the past year had been manager of Control Mines. He had also been connected with Shattuck-Denn Mining Co., as manager and with Calumet & Arizona Mining Co. He was a member of the Arizona branch of the American Mining Congress in which he was a director and committeeman of the national chapter.

Charles W. Swanton, 77, died at Canon City, Colo., March 10. His engineering career included practice in Utah, Colorado and Nevada.

Eben H. Beebe, 78, died March 3 at Grand Junction, Colo. He was a Cripple Creek pioneer and the father of A. H. Beebe, manager of mines for the Golden Cycle Corp.

Harry W. Montague, 55, for many years employment agent for the Inspiration Consolidated Copper Co., and the International Smelting & Refining Co., died February 28, in Inspiration.

Kenneth C. Shaw, Jr., young consulting engineer of the Lake Superior region died March 13 of pleural pneumonia at Manizales, Colombia, South America, where he had been serving in consulting capacity since last November.

Charles N. Replogle, Sr., for many years General Manager of Flood City Brass and Electric Co., died March 22, 1944, after a very brief illness.

John B. Thomas, 59, general superintendent of coal mines for the DeBardeleben Coal Corp., died March 8 at the Mayo Hospital, Rochester, Minn. He had been with the DeBardeleben Corp. for about 20 years and was widely known in the coal mining industry.

Colonel Hansen Evesmith of Fargo N. Dak., formerly of the Lake Superior region, died March 27 at age 76. Colonel Evesmith was a life member of the American Mining Congress, and was long associated with mine activity in the Lake Superior region.

Dr. Charles Herman Fulton, 70, nationally known metallurgist, and since 1942 Professor of Metallurgy at the Montana School of Mines, died April 9 at Butte, Mont. He taught metallurgy at Columbia University, University of Wyoming and the South Dakota State School of Mines, where in 1905 he was made president. He was later professor of metallurgy at Case School of Applied Science until 1920 when he was made Director of the Missouri School of Mines at Rolla, Mo., from which position he retired in 1937.



### Eastern



### States

### PENNSYLVANIA

Nampower Commission state director of Pennsylvania, recently announced a state drive to return former miners to jobs in the anthracite and bituminous fields. The program calls for U. S. Employment Service offices to contact former miners and urge them to return to mine jobs "entirely as a matter of personal choice." The announcement followed closely on the heels of a War Production Board decision opposing coupon coal rationing next winter.

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» » Examinations for assistant mine foremen and electricians will be given June 1 and tests for prospective foremen and fire bosses will be conducted June 2 at Johnstown, Windber, Barnesboro and Indiana by inspectors of the Pennsylvania Department of Mines.

The Johnstown examinations will be in charge of Spurgeon S. Johns of Westmont, inspector for the twentyeighth district. The personnel of the board has not been announced.

At Barnesboro, examinations will be supervised by Dennis J. Keenan, inspector for the fifteenth district; Wendell Young, Marsteller; Richard Todhunter, Barnes & Tucker Coal Company, and Samuel Cortis, inspector for the tenth district.

M. W. Thomas, twenty-fourth district inspector, will be in charge at Windber, with John Kerr, Berwind-White Coal Mining Company; Versal Leighty, Reitz Coal Company, and John Kimmell, inspector for the sixth district, assisting.

The Indiana tests will be directed by Andrew J. Bengston, inspector for the twenty-fifth district; George Plant, Sagamore, and John Frampton, Indiana.

» » Winder impetus of war needs, the beehive coke industry has contributed heavily to the needs of the nation's blast furnaces, according to Joseph A. Kelley, of the Bureau of Mines.

Speaking to a committee of the American Institute of Mining and Metallurgical Engineers in the William Penn Hotel, Kelley declared that the industry sent more than seven million tons of coke to the nation's blast furnaces in 1943.

"This extraordinary achievement of an industry long considered dead is worthy of consideration, since without this supply of beehive coke blast-furnace demands of our national steel expansion program could not possibly have been met in such a satisfactory manner." He stated that today 88 percent of all behive coke produced in the nation goes directly to blast furnaces.

» » The 1943-44 coal year ended March 31, with production of 57,769,100 tons of anthracite, 196,500 tons more than in the preceding coal year. While relatively small in tons, this advance was made in spite of three major and several minor work stoppages which caused a loss of over 4,400,000 tons. The irreplaceable loss of over 11,000 men since Pearl Harbor (3,000 during the past coal year) and the natural difficulties of maintaining normal production in the midst of general wartime conditions also affected the industry.



New American Optical Company Ful-Yue acetate safety goggles are made extremely light in weight without sacrificing strength. The new plastic goggles are particularly suited for the "metal-allergic" worker whose skin is sensitive to metal goggle frames, and for operations where sparks might cause fire or explosions

» » On account of mine-cave damages in Blakely and Winton Boroughs, the Lackawanna County April grand jury recommended in its final report to the court that "the state and Federal Government should pass legislation and appropriate money to start a program designed to remedy the dangers of surface subsidence resulting from coal mining." Secretary of the Interior, Harold L. Ickes, in a letter to District Attorney Brady, says he believes the surface subsidence problem in the anthracite area can be remedied only by a long-range permanent program.

»»» Members of the Pennsylvania Sanitary Water Board are pressing certain anthracite coal operators to stop dumping silt into the Schuylkill River. At a hearing attended by over 200 civic and industrial representatives of the Schuylkill Valley, A. H. Stewart and J. R. Hoffert of the Board sought the cooperation of all communities in the affected area in the effort now being made to eliminate pollution of the stream.

The anthracite stream pollution committee has been cooperating with the Pennsylvania Sanitary Board in an endeavor to prevent breaker silt from getting into the rivers. A questionnaire was sent to coal mining companies for the purpose of getting authoritative data on the amount of breaker silt polluting the streams.

» » » The Harrisburg office of the War Production Board will open a branch office in Scranton, Pa. Mr. P. W. Webster will have charge of the new office which will be of convenience to anthracite operators.

» » » In cooperation with the Bureau of Standards, Anthracite Industries, Inc., Laboratory, 101 Park Avenue, N. Y., has made arrangements to supply small amounts of anthracite to laboratories throughout the country for testing purposes. As the test coal will be selected and analyzed by

### PETER F. LOFTUS Consulting Engineers

ENGINEERING AND ECONOMIC SUR-VEYS, ANALYSES AND REPORTS ON POWER APPLICATIONS AND POWER COST PROBLEMS OF THE COAL MIN-ING INDUSTRY

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### L. E. YOUNG

Consulting Engineer

Mine Mechanization Mine Management

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Anthracite Industries Laboratory before shipment, a greater degree of standardization is assured than has heretofore been possible. All solid fuels will benefit since present test codes for practically all devices specify anthracite as the test fuel.

To facilitate the distribution of this fuel OPA in Amendment 52 to Order SR 1, will exempt this coal from price control as of April 1.

» » The Anthracite Committee re-cently reported: "Sixth Survey of Bootleg Holes," definitely proves that a substantial percentage of bootleggers are itinerants rather than men who have been bootlegging since depression days.

Out of a total of 2,725 bootleggers as of October 14, 1943, 1,041, or 38 percent, had left their holes five months later. These were partially replaced by the entrance of 536 new men into the business, bringing the March 31, 1944, total up to 2,220.

Proof that the depletions were largely voluntary is shown by the fact that 829 or 79 percent of the 1,041 men simply quit to unknown destinations as against only 12 percent drafted, 7 percent hired by collieries, 1 percent killed in bootleg holes, and 1 percent died of natural causes.

### WEST VIRGINIA

» » The National Steel Company, a subsidiary of Weirton Steel, has acquired approximately 4,900 acres of coal land in the Clinton district field on the upper Freeport vein along the Monongahela River. The transaction involves a cash settlement of \$461,000 and was said to be the forerunner of still further purchases still to be negotiated. The holdings purchased were those of the Cornell Coke Company and the Clinton Coal Co.

» » Since March 1 inside and outside workers of Island Creek Coal Company, Marianna Smokeless Coal Company and Pond Creek Pocahontas Company have been eligible for rewards to full-time workers.

The individual award is a white safety cap with red-white-and-blue shield on one side and an inscription, "Service Award," on the other.

"As the length of service period grows longer," states J. J. Foster, assistant to vice president and general manager, Island Creek Coal Company, "without loss of a day on which the mine operates, additional credit will be given in the form of chevrons for specified lengths of service."



Developments of the past ten years in mining methods have led to a very wide use of I-T-E air-immersed circuit breakers and switchgear. Consistent study of mining problems has kept I-T-E in the forefront with the result that I-T-E equipment has been a vital factor in mechanized recetions.

### Automatic Reclosing Circuit Breakers

T-E automatic reclosing circuit breakers with load measuring characteristics are widely used in reclosing circuit breakers are mines where d-c troiley and feeder systems are stondisting service. Steel encloseming circuit breaker for sectional area from the service of the serv

### Load Distributors

I-T-E Type LDR Load Distributor improves service from two or more M-G sets or rotary converters in parallel on same system but widely separated. Generator loads are balanced to prevent over-heat-ing, outages are reduced, peaks are limited and life of system and connected equipment prolonged.

### Automatic Switchboards For Mines

Automatic Switchboards For Mines
I-T-E has designed and built many switchboards
in recent years for semi-automatic or full-automatic protection and control in connection with
local generating systems or purchased energy.
The switchboards are for service with M-G sets,
rotary converters and mercury-acrectifiers. Much
of the equipment, including circuit breakers and
protective relays, has been designed specifically
for mining service. Mounting is simplified and
there is much flexibility in space arrangements.
A typical installation is at right. (Fig. 4.)

Representatives in Principal Mining Areas CIRCUIT BREAKER CO







»»» Bartley No. 1 mine of Pond Creek Pocahontas Co., recently received recognition by the West Virginia Department of Mines for "producing in excess of 1,000,000 tons of coal without a fatality." J. M. Holbrook, superintendent, and John M. Farley, foreman, were mentioned in the citation.

### OHIO

»»» More than 150,000 "cuttings" will be obtained this spring with the aid of St. Clairsville High School pupils. Charles MacIntyre, general manager of the Ohio Reclamation Committee, has secured the services of high school pupils to cut the cuttings and place them in bundles, classified as to size and take them to the strip banks for replanting. The cuttings will be secured from special poplar trees on the Coleman property east of the town and donated to the Reclamation Committee by the owner, Mike Coleman. The cuttings are fast growing and regarded as excellent pulp wood maturing in about 8 years.

» » The M. A. Hanna Company, coal, ore, dock and vessel operator, reports consolidated net income of \$843,413 for three months ended March 31, 1944, after all charges including \$411,939 for depreciation and depletion and provision of \$414,469 for Federal taxes on income. This is equal, after preferred dividend requirements, to 67 cents a share on the 1,016,961 outstanding common shares.

In the corresponding period of 1943 net income was \$854,056 after all charges, including \$248,270 for depreciation and depletion and provision of \$673,710 for Federal taxes. This was equivalent to 68 cents a common share.

### MARYLAND

>>> Announcement was made recently that the Consolidation Coal Company had leased to a corporation known as the Consolidated Fuel Company all of the Maryland mines owned and operated by the Consolidation Coal Company. Mr. Wm. E. Jenkins, a well-known Frostburg coal operator, has leased the property from the Consolidation Coal Company. The mines in operation are No. 1 at Ocean, No. 3 at Hoffman, No. 4 at Eckhart, No. 10 at Eckhart, and No. 17 at Klondyke or Lord. At this time the daily output of these mines is approximately 1,200 net tons of coal per day, and there are about 500 employes.

William E. Jenkins is president of the Consolidated Fuel Company, and William S. Jenkins, his son, is secretary.

### ALABAMA

» » In compliance with the request of the Solid Fuels Administration, a survey of Alabama coal miners under the age of 31 is being made. Announcement was made by Howard J. Thomas, area distribution manager for the Federal agency. Thomas said the survey is essential, "due to the increasing seriousness of the coal mining industry." The Birmingham District is still short more than 2,000 men, and the new draft policy of calling 18 to 26 year old workers into the armed forces, will add to this shortage.

» » The DeBardeleben Coal Corporation, one of the oldest and largest operators of the state, with headquarters in Birmingham, have announced the promotion of three of their executives:

Henry F. DeBardeleben, to be executive vice president and general manager. He began work for the company in 1919, and in recent years has been vice president in charge of marine operations, at New Orleans.

marine operations, at New Orleans.
Alvin W. Vogtle, to be vice president in charge of all sales and traffic.
He has been with the company for 26 years, in course of which time he has become one of the nation's outstanding authorities on Southern freight rates.

John W. Crawford, to be secretarytreasurer. He has been with the company for 23 years.

All of these men are native Alabamans, and reflect credit to the state by their achievements.

»»» There have been several unauthorized strikes in the Birmingham District in the last month, holding up production in coal mining and in steel manufacture. These all seem to have been ironed out, and conditions now are about normal.

### **NORTH CAROLINA**

» » » Kyanite suitable for use in the glass industry, that is, containing less than 0.15 percent of iron oxide (as Fe<sub>2</sub>O<sub>3</sub>) has been produced by the Yancey Kyanite Co. at a mine located 2% miles southeast of Burnsville, N. C. This mine, which has been the only source of "glass grade" kyanite in the country, has recently been studied by representatives of the Geological Survey, United States Department of the Interior. According to Director William E. Wrather, a geologic report, accompanied by maps and sections, describing the geology of the mine and of closely adjacent areas has been placed in open files in the offices of the Geological Survey in Washington, D. C., and in the McCall Building, Spruce Pine, N. C.

The use of kyanite in glass making produces a heat-resistant glass of high chemical durability. The present workings of the Yancey Kyanite Co. consist of three quarries and about 200 ft. of underground drifts and crosscuts.

» » Drills began work in Chatham County recently probing for veins of an old coal field which mining engineers say might produce as many as 46,000,000 tons to help fill America's fast depleting fuel bins. The work, financed by the U. S. Bureau of Mines, is the first exploration for coal in generations in this state, which long since had become convinced that the Deep River coal was irretrievable.

First tests are being made about 2 miles south of this village, but others will be made over a wide area of Lee and Chatham Counties in central Carolina. The deposits in this section had been worked intermittently and unsuccessfully since Revolutionary days, but a series of disastrous explosions in 1925 and 1930 halted operations. Recently old shafts were cleared and around 25 tons of "token" coal are being mined daily.

The coal exploratory project is part of a widespread search by the U.S. Bureau of Mines to uncover strategic minerals in North Carolina, which long has been regarded as a geological curiosity because of the presence in the state of some 300 different minerals, most of them in non-commercial The program resulted quantities. from a preliminary survey ordered by Gov. J. M. Broughton last year. Drillings uncovered one of the largest deposits of tungsten known in America (in Vance County) already in production, and substantial deposits of molybdenum. After the coal project, drillings will be made for iron ore in the western part of the state.

Recently large areas of land in coastal Carolina were leased for petroleum drillings.

The coal drillings are being made by the Pennsylvania Drilling Co. Cores will be taken every 10 ft. for analysis.

WANTED: Mining Engineer for large mine in southern West Virginia. Must be capable of handling all engineering problems, including surveying, mapping, detail drawings, construction work, etc. Good conditions, good pay and splendid opportunity for right man. Inquire of Box No. B, care of this publication, 309 Munsey Bldg., Washington 4, D. C.

### Central



### States

### TRI-STATE

» » » A new shaft is being sunk on the northeast 40 of the old Eastern Lead and Zinc Company Hutig lease a mile northeast of Picher by the M. & W. Mining Co. I. W. Andrews, of Joplin, is superintendent. The sinking and hoisting derrick being used was moved from the No. 6 shaft to the new site, which will be called the No. 7 mine shaft. Upon completion of the shaft, ore rock will be trucked to the No. 1 mill of the Beck Mining Company, about a mile to the southwest for treatment.

» » W. E. Wrather, director, U. S. Geological Survey, has announced the preparation of a preliminary map of part of the Picher zinclead mining field which shows in color the geologic structure and the distribution of dolomite. The set of maps, six in number, are 27 in. by 27 in. and are of interest and value in the detailed work covering particular operations in the field.

» » An acute labor shortage has developed in the Tri-State district to the extent that the Eagle-Picher Mining and Smelting Company, leading producer of war-vital zinc and lead concentrates in the area, closed three major producing mines and its Bird Dog central mill in the Picher field May 4.

Crews from the affected properties, the Grace Walker Nos. 1 and 2 southeast of Picher and Gordon No. 2 northwest of Picher—are being shifted to other company operations.

In addition, the company has been forced to reduce production about one-half at its Galena smelter. The shortage amounts to about one-third the normal complement of 300 men. As about one-third the normal crew are maintenance, the shortage of a third of the total men has resulted not only in forcing some departments to shut down entirely, but also in cutting in half the output of other units still able to operate.

A few weeks ago, Kansas Explorations, Inc., also reported that because of labor shortage they were forced to close Buckingham No. 2 mine, north of Oronogo, and shift the depleted crew to bolster the other company operations. Many other companies operating throughout the local mining field are confronted with the same problem.

Ross Blake of Joplin, district manager of Kansas Explorations, has reported the closing of the company's Lotson mine, southwest of Cardin for similar reasons.

Eagle-Picher representatives pointed out that recent shutdowns are only the beginning, as the present rate of inductions continues to cut deeper into the ranks of the available labor supply of the district. Many of those called who are disqualified for the armed forces because of physical reasons fail to return to employment in the mines.

Government employment agencies in the district have been unable to cope with the situation.

At present they are making every effort to keep miners at work, permitting some shifting from one mine to another and making a few changes in job classifications in order to hold men in the district.

The local mine labor supply situation now is at its lowest and most critical stage in the history of the mining field, and likely will get worse. Nearly every operator in the field has been, is, or will be, short from 10 to as high as 50 percent in ground crews.

### MICHIGAN

» » » The Isle Royale Copper Co., Houghton, contributed 6,279,771 lb. of copper to the war effort in 1943, with a reported net profit of \$35,449. Total cost per pound after all charges was 23.255¢. Costs, especially for labor, are so high that Government assistance is absolutely necessary in order to operate. The company's contract with Metals Reserve Company has been extended to the end of May with a reported slight reduction in price.

The yield per ton of rock milled was 20.359 lb. of copper. Crude concentrating results are now being achieved at the stamp mill which treats native copper from amygdaloid ores. A change of practice in handling the primary slimes produced in mining and crushing, representing roughly 25 percent of the original ore feed, now permit closer control of the pulp densities and more uniform feed and action in the flotation machine. These slimes are now being treated separately. The pulp density of the flotation feed from the ball mills may now be increased to the point where relatively coarse copper particles float very readily. The increased grinding and flotation capacities have reduced tailing losses and made possible the recovery of an additional 11/2 lb. of copper per ton of ore milled.

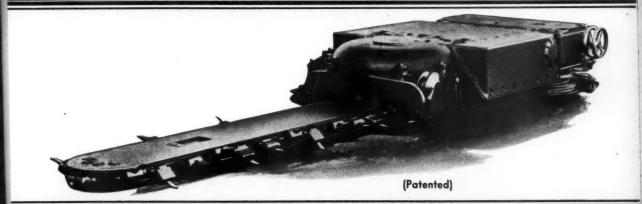
With reference to the proposed stockpiling of metals by the Government at the end of the war, officials of the company say: "The present war has definitely established the fact



620,000,000 TONS OF BITUMINOUS COAL FOR 1944

### JEFFREY CUTTERS

will figure prominently in reaching this goal



### FOR THIN SEAMS JEFFREY 35-L



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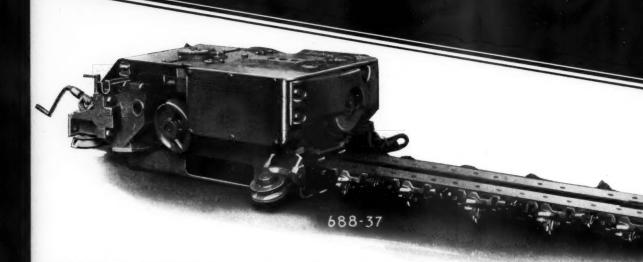
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URNAL

• Low overall height combined with ease of handling makes it particularly adaptable to thin seam operations. Simple rugged design — powerful 50 H.P. motor — large shaft and gears — low speed bearings... are a few of the many construction points contributing to the dependability of the Jeffrey 35-L and its immunity to frequent breakdowns.



### JEFFREY SHORT



(ABOVE)

### JEFFREY 35-BC CUTTER

This conveyor type shortwall cutter is identical to the 35-BB continuous duty machines except that it is powered by a 35 H.P. motor. It retains the rugged mechanism and heavy construction of the famed 35 series Shortwall machines. All Jeffrey Shortwall machines are available with either A. C. or D. C. operation and as open or Government approved equipment.

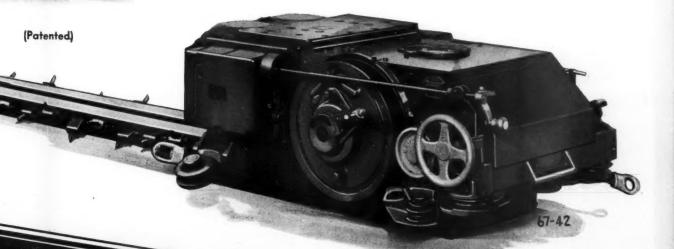
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### TWALL CUTTERS

This is a continuous duty machine with a 50 H.P. motor. The independent operation of the feed and handling mechanism makes control very flexible, permitting the machine to be sumped and the cut started across the face with one setting of the jacks. Jeffrey Shortwell coal cutters have been the accepted standard of industry for many years. They are designed to meet every requirement of shortwall mining.

JEFFREY
35-BB CUTTER

(BELOW)



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that a stockpile of strategic metals is indispensable to a sane program of national safety. Furthermore, the vast stocks of copper that will be in the hands of the Government at the conclusion of the war would completely wreck the copper industry unless neutralized under some form of stockpiling."

### NORTH DAKOTA

»»» A recent report indicates that the Northern Pacific Railroad is soon to commence construction of a 61/2-mile spur track to the new 20,000,-000-ton lignite coal field at Hazen in West Central North Dakota. It is expected the new mine of the Truax-Traer Coal Co. will open next fall. Plans of operation call for approximately 250,000 tons of coal to be taken out the first year of operation and 500,000 tons a year thereafter. Output of the new field will be utilized largely by western Minnesota and North Dakota industries. According to estimates, the new spur, including the necessary switching trackage, will cost approximately \$300,000.

### TEXAS

>>> Plans for an "International Mining Day," to be held in El Paso early next fall, are being worked out at the Chamber of Commerce. A directory of mining men in New Mexico, Arizona, Colorado, Texas and Mexico is being compiled.

Mining men in the southwestern area, who would be invited to attend the meeting would study pending mining legislation and other problems of vital interest to the mining industry in the southwest.

"A Silver Dollar Day," to emphasize the actual value in metal of the dollar, will be held in connection with the meeting.

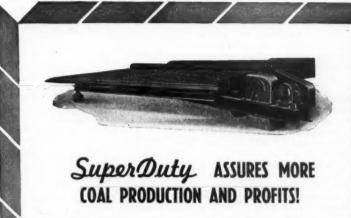
### WISCONSIN

»» A recent report on the Cary mine borehole at Hurley states that it has reached a depth of over 2,350 ft. below surface. It is thought that the borehole will be completed to a depth of 2,600 ft. in a short time. A 5½ ft. diameter borehole is being sunk by the Newsom process for Pickands Mather & Co., for whom a similar bore was completed at the Zenith mine on the Vermilion iron range in Minnesota. After completion, the borehole will be stripped down to standard size hoisting shaft for operations of the Cary iron mine.

>>> The presence of the Norrie, Anvil, Pence, Yale and Plymouth iron formations has been shown by the U. S. Bureau of Mines trenching program across the eastern

Gogebic iron range, in the vicinity of Iron Belt, Wis. The full width of the iron formation at this point is about 600 ft. It is reported that the U. S. Bureau of Mines will soon start on a geophysical exploration program for minerals over a large area at Crystal Falls, Mich., on the Menominee iron range. Clyde L. Holmberg, of Ironwood, Mich., mining engineer, is project engineer on this work, and O. W. Terry, engineer, will be in charge of the geophysical survey.

»»» The E. J. Longyear Company has been given the contract for diamond drilling some of the areas of the former Commonwealth Group of iron ore properties near Florence, Wis., on the Menominee range for Pickands Mather & Co. This group of ore lands was formerly controlled and operated by the Commonwealth Iron Co. Later Oglebay Norton Co. were operating agents and owner. The group includes the Badger, Davidson, Commonwealth and Buckeye mines.



Marketable coal production and operating profits are being greatly increased by many coal operators who are modernizing their coal washing operations with SuperDuty Diagonal Deck Coal Washing Tables. Backed by 38 years of engineering "Know-How," SuperDuty Tables assure maximum recoveries, save many hours of critical time and labor and increase daily output of marketable coal.

Don't permit old-fashioned coal washing methods to steal your profits or retard your marketable coal production . . . modernize with SuperDuty. Write for descriptive Bulletin No. 119-A and see for yourself why SuperDuty Tables are first choice with shrewd operators—large and small alike.



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### American Zinc Institute Meets in St. Louis

" » » The twenty-sixth annual meeting of the American Zinc Institute, held in St. Louis April 17 and 18, was probably the most interesting and successful ever held. Registration totalled 259 and over 300 were present at the annual dinner. Members of the zinc industry, WPB and Bureau of Mines officials, and the galvanizers committee, representing the industry's largest market in normal times, presented a series of addresses which sketched clearly the current outlook and some of the longer range problems facing zinc producers.

The morning session on April 17 was opened by President Howard I. Young, who emphasized the importance of continuing full production with all available manpower, at least until Germany has been finally de-feated. E. V. Gent, secretary, and K. J. T. Ekblaw of the market development division of the Institute, reported fully on the organization's activities and plans for the future. Ekblaw foretold an immense post-war farm building and rehabilitation program, which, if an aggressive sales promotion campaign is carried on, will provide a splendid market for zinc coated products. In a paper on "WPB and the Current Zinc Outlook," M. L. Trilsch, assistant director of WPB's Zinc Division, outlined the supply, requirements and stock situation, forecasting an increase in stocks of slab zinc to a total of 302,000 tons at the end of 1944; he pointed out, however, that this made no allowance for anticipated curtailments due to manpower shortages. John D. Sullivan of Battelle Memorial Institute discussed "The Postwar Future for Heavy Metals," bringing home to his listeners the probable strong demands that will exist for non-ferrous metals, as outlined in his paper appearing in the March issue of THE MINING CONGRESS JOURNAL. An official War Department motion picture concluded the session.

The afternoon session, presided over by Charles A. Neal, president of the Tri-State Zinc & Lead Ore Producers Association, was opened with an address by Julian D. Conover, secretary of the American Mining Congress, on the stockpiling of metals and minerals. Stressing the importance of a permanent stockpile policy from the standpoint of national security, Mr. Conover pointed out that this is the No. 1 post-war problem of the non-ferrous metal mining industries. He took the position that war-end stocks of zinc, lead, copper and other strategic metals are not surplus property, and should not be liquidated but conserved against the needs of a future emergency. His address appears in full on pages 30-33 of this issue.

T. H. Miller, chief of the Metals Economics Division, U. S. Bureau of Mines, discussed the long-range outlook for zinc, predicting that the United States can no longer enjoy self-sufficiency in zinc and that the deficit in post-war years, to be met from imports, "may range upward of about 200,000 short tons a year." H. Snyder, president of Combined Metals Reduction Company, held that the speaker was unduly pessimistic and that zinc mining in the past decade had been held down by restrictive Government policies which prevented "money with courage" from developing new production. A roundtable discussion of present-day zinc production and prospects, punctuated by numerous questions and an exchange of views from the floor, was led by three speakers-R. B. Caples, manager, Great Falls Reduction Department, Anaconda Copper Mining Co., for the Rocky Mountain and Western Region: Evan Just, associate editor of Engineering & Mining Journal, for the Mississippi Valley Region; and R. B. Paul, resident mining engineer, New Jersey Zinc Co., for the Eastern Region.

James Douglas, director of the Zinc Division of WPB, then presented a comprehensive analysis of zinc concentrate production in relation to the premium price plan, showing the proportion of zinc production in each area from "A," "B" and "C" quota mines and the average prices paid. For the last quarter of 1943, he said, 63.7 percent of the total U.S. mine production was from "A" quota mines. with an average price paid of 9.38 cents per pound; 15.4 percent from "B" quota mines, at an average price of 13.00 cents; and 20.9 percent from "C" quota mines, at an average price of 15.64 cents. Mr. Douglas analyzed the effect of anticipated manpower losses, saying it is fairly certain that all able-bodied men in the 18 to 25 age group will be inducted within the next two or three months. He estimated an annual loss in production of 70,200 tons from this cause (total 1943 mine production was 742,000 tons), and a further loss of 74,200 tons if miners aged 26 to 29 are taken by the armed forces. He pointed out that labor shortages will bring increased costs, forcing many mines either to seek higher premiums or to close down. Referring to the concern of many producers over possible cancellation of "C" quotas to eliminate low-productivity high-cost production, he stated definitely that "until the effect of the apparent labor shortage is known no action will be taken toward the revocation of the 12%c to 16 1/2 c premium price bracket."

Those attending the informal din-

ner Monday evening heard a ringing address by Charles M. Hay, a native Missourian now serving as general counsel of the War Manpower Commission, who took as his subject "What's Right with America."

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The Tuesday morning session was presided over by Raymond F. Orr, president of Athletic Mining and Smelting Co. Following reports by the treasurer and the traffic committee, R. A. Young, resident manager of the Dumas Smelter of American Zinc Company of Illinois, summarized the zinc smelting situation in the United States and in foreign countries. Outstanding changes in this country during the war period, he said, have been (1) the increased proportion of total metal produced by the electrolytic process (electrolytic production having increased 87 percent in three years compared with a 33 percent increase from primary distillation plants); (2) the significant increase (approximately 300 percent) in output from foreign ores, which today accounts for about one-third of total slab zinc production in the United States; and (3) the radical changes in grades of metals produced to meet war requirements, the major increase having taken place in the high-grade zinc required for small arms ammunition and other brass products. Mr. Young contrasted the encouragement given to zinc smelter production in other countries with our own Government's policy as evidenced in reduction of tariff duties, and urged a more sympathetic attitude which would permit retention of an adequate and modern domestic zinc smelting industry, for otherwise any future national emergency might well find our country insofar as zinc supply for war is concerned in a much less enviable position than we have had in the present conflict."

The post-war prospects for zinc alloy die castings and for galvanizing were presented by S. E. Maxon, New Jersey Zinc Sales Company, and Nelson E. Cook, Wheeling Steel Corporation, respectively, who pointed out the many desirable properties of zinc which would insure its continued use in these major fields in future years.

The Board of Directors at its annual meeting re-elected Howard I. Young, president of American Zinc, Lead & Smelting Co., as president of the Institute for the tenth successive year. Other officers elected were: Vice presidents, C. Merrill Chapin, vice president, St. Joseph Lead Co., New York; John A. Robinson, vice president, Eagle - Picher Mining & Smelting Co., Miami, Okla., and R. B. Caples, Anaconda Copper Mining Co., Great Falls, Mont.; treasurer, Raymond F. Orr, Athletic Mining & Smelting Co., Fort Smith, Ark.; and secretary, Ernest V. Gent, New York.

### Western



### States

### ARIZONA

»»» Contract to construct a two and one-half mile access road to the Bagdad mine, near Hillside, has been awarded to Wallace and Wallace, a Phoenix contracting firm, for a bid of \$39,128.60. Federal funds will be used.

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- mine in the Mazatal mountains near Tonto Basin, Gila County, is now being operated under the name Midco Reserves, Inc. A crew of 20 men are at work under B. N. Hulbert, superintendent. The company headquarters is in Chicago, Ill.
- >>> The New Cornelia open pit operation of the Phelps Dodge Corporation is reported to have produced in 1943 some 8,961,111 tons of ore and 6,700,804 tons of waste. Dump trucks were used to move 1,842,480 tons of waste material. The concentrator treated 8,956,698 tons of ore or about 25,000 tons per day. Exploratory and development operations were said to include 10,008 ft. of drifting, 2,337 ft. of raising, 642 ft. of Calyx drilling, and 53,691 ft. of diamond drilling.
- "> The Irene zinc, lead and copper mine lying 3 miles north of Globe, has been leased from the Liberty Mining Company by the American Smelting and Refining Company.

Born of the early silver days in Arizona, the Irene mine passed through hands of various owners until in 1929 the Liberty Mining Company was organized by Anton Trojanovich to promote the property. A year ago the mine was leased by the American Zinc, Lead and Smelting Company of St. Louis. Diamond drilling operations to discover zinc values were abandoned and the lease terminated some weeks ago.

New exploration work will be under the direction of W. H. Loerpabel, Tucson, manager of the southwest department of the A. S. & R. Co.

>>> The Arizona Chrysotile Asbestos Company, operators of the old Ragal group of asbestos claims, 49 miles northeast of Globe, has undergone reorganization. New officers are Charles E. Huntzicker, president;

H. W. Huntzicker, secretary-treasurer; George Kohl, superintendent; and Newell Wisner, mine superintendent. A crew of 25 men are employed in milling to filter grade and production of Nos. 1 and 2 soft fiber asbestos.

» » A wage increase of 50 cents per day, asked for by the Johns-Manville Products Corporation for its employes at Chrysotile, Gila County, has geen granted by the War Labor Board, the increase is retroactive to January 1, 1943.

### COLORADO

- »»» During the recent Red Cross drive, mining companies and leasers in the Cripple Creek district donated a carload of gold ore. The ore was hauled free by the Midland Terminal Railroad, and treatment was made free of charge by the Golden Cycle Corporation.
- » » » The American Fluorspar Corporation is making underground improvements at its property near Salida to increase production which is now averaging 800 tons of gravel and 1,200 tons of milling ore a month. The mine operates on two shifts with about 35 men employed. Charles H. Hyde, Buffalo, N. Y., is head of the corporation, and S. H. Lloyd, of Colorado Springs, is vice president and general manager. Production goes to the local 110-ton mill of the Fluorspar Processing Co.
- » » The Buckskin Joe Mines, Ltd., near Alma, was recently granted a high priority rating and therefore allowed to continue operations because of the high zinc content of the ore. Charles W. Jordan is general manager and Joseph Thibodeau is superintendent. The company operates a 75-ton selective flotation mill which was in continuous operation during 1943.
- » » A group of claims recently located by A. D. Smith, of Colorado Springs, in Cochetopa Canyon, 28 miles south of Gunnison, is being prospected for cinnibar under the direction of John J. Hill, mining engineer, of St. Paul, Minn. The work is being financed by St. Paul men. A large fumarole is present, and indi-

cations point toward development of an open pit operation.

- » » The Resurrection Mining Company, which is one-third owned by Newmont Mining Corporation, is reported to have milled 105,765 tons of sulfate ores from its mine at Leadville in 1943. In addition, custom ores were milled and a small tonnage of oxide ores was shipped directly to smelters. Premium prices were received for lead and zinc throughout 1943. Development work, however, failed to maintain proper reserves and the heavy charges for depreciation of plant and depletion of the ore bodies allowed only a nominal profit.
- » » » The new mill of the Molybdenum Corporation of America, at Urad, is said to be getting under way for test runs. Walter J. Eaton is general superintendent, and S. C. Blickensderfer is mill superintendent. The new mill is of excellent construction being built of steel and concrete covered with sheet metal and enclosed in a fabricated insulation material. Initial capacity will be 200 tons with the mill so designed as to be easily adaptable for additional installation. The ore will be processed through rod mills and separation will be by means of flotation without the use of tables.

### UTAH

- » » Net income of the North Lily Mining Company for 1943 amounted to \$17,284.26, before depletion, according to the company's annual report. During the year the company carried on an active program of mining and development in the various properties in the Tintic (Utah) district under its control and supervision. Production amounted to 11,549 tons of dry ore, yielding 241,537 lbs. of copper, 283,103 lbs. of lead, 340,696 lbs. of zinc, 50,753 oz. of silver. and 11,287 oz. of gold.
- » » Combined Metals Reduction Company, operating mines and concentrators in Utah and Nevada, reported heavy mine operating losses due to undermanned productive working places, high taxes, depreciation, high labor costs and depletion cutting deeply into the net profits of operations of the company. Net profit was \$83,498 after all charges with net smelter return of \$3,989,465, a net profit of slightly more than 2 percent. Despite the problem, the company made a notable contribution to war metals production.
- » » The Chief Consolidated Mining Co., at Eureka, has reported mining 61,810 dry tons of ore yielding

1,282 oz. of gold, 232,727 oz. silver, 3,552,404 lbs. of lead, 25,857 lbs. copper, 6,293,351 lbs. zinc during the year Total income for the year amounted to \$667,068 with a net operating profit before depreciation of \$142,177. Net income carries a surplus of \$88,434. Principal production came from the Chief No. 1 mine between the 1,800 and 2,100 ft. level with principal values in zinc and lead for war production. Most important development work was the drift connection on the 1,800 ft. levels to the Gemini zinc, making it possible to reroute the water on the 1,600 ft. level and saving a pumping lift of 200 ft. Present mine production is possible only because of the premium paid by the Government.

### MONTANA

» » » Passage by the Senate of the Murray-Scrugham Tunnel Site Bill, S. 1479, suspending assessment work on mining claims, was said by Senator James E. Murray, of Montana, in a recent interview, to be a much needed correction of the oversight which omitted these claims from the general assessment moratorium law.

The provisions of Public Law 47, Seventy-eighth Congress, for the suspension of the requirement that \$100 worth of labor must be performed or improvements aggregating that amount be made each year relates only to assessment work required to be performed on mining claims under section 2324 of the Revised Statutes.

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Senator Murray stated: "The Supreme Court of the United States has held that a tunnel site is not a mining claim within the meaning of section 2324 of the Revised Statutes, and consequently the assessment moratorium now in force does not apply. With the present shortage of manpower and material it is absurd to demand that any unnecessary work be performed; at the same time claim owners should be protected from losing their property."

### **NEW MEXICO**

»»» Principal speaker and guest of honor at the annual meeting of the New Mexico Miners and Prospectors Association, held April 21-22, at Albuquerque, was U. S. Senator Pat McCarran, of Nevada. Senator Mc-Carran is among the outstanding champions of the mining industry and is intensely interested in the industry's post-war problems. His address was the highlight of the two-day meeting which brought together all the metal mine, coal mine and non-metallic mine operators of New Mexico in a round-table discussion of expanded mining operations to meet the demands of war and the problems of the reconstruction period following the war. Presiding over the session was President Fred O. Davis, of Carlsbad, assisted by Secretary Albert P. Mracek, Silver City.

»»» The New Mexico Ore Processing Company of Silver City has purchased the flotation mill built and operated by the Continental Chemical & Ore Company and will make installations of new equipment and enlarge its capacity to 100 tons of ore daily. It will handle ores of the Peerless mine at Central, Grant County, as well as custom ores.

» » The Board of Regents of the New Mexico School of Mines at Socorro has announced a continuance of the school for the term of 1944-45, despite the withdrawal of a large unit of Army Engineer trainees, enrolled the past year, to bring attendance at the institution up to a record high. The State School of Mines is one of New Mexico's oldest higher institutions of learning and its graduates are sought by mining companies of the west. Now in the armed forces are upwards of 200 or more former students.

### FOR SAFE .. QUICK TAMPING USE BAGS

SEALTITE TAMPING BAGS give a safer method of sealing shots. Safer—because the material is always uniform and bags are easily tamped compactly. They make tamping easier and quicker because a prepared supply can be placed at the face in advance of the shot-firer's need. There's no time wasted in scraping-up something to tamp with.

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The suspension of assessment work on tunnel sites extends to six months after the cessation of hostilities.

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### NEVADA

» » » Several of the smaller tungsten producers in the state have closed down in recent weeks, as Government prices would not permit continuation of their operation. Word that the tungsten mill operated by the Metals Reserve at Salt Lake City would close April 30, also had the effect of causing several mines to ship their last carloads and then close down.

»»» The annual report of Goldfield Consolidated Mines Company shows the corporation to be in sound financial condition, but points out that due to continuing adverse conditions little production or development at the old Aurora and Goldfield camps took place. While the company has a substantial balance sheet, it shows only a net profit from operations for 1943 of \$52,501. It has numerous assets which have been idle for a year or more.

»»» Mountain City Copper Company, a subsidiary of International Smelting and Refining Company, suffered a loss of \$143,613.25, before deduction for depletion during 1943, according to the annual report of the company. Mountain City operates properties at Mountain City, Nev., and maintains headquarters at Salt Lake City, Utah. F. A. Wardlaw, Jr., president, states that production and development both suffered as a result of the manpower shortage.

During the year the mine produced 4,320 wet tons of shipping grade ore and 107,726 wet tons of milling grade ore containing 10,056,207 lbs. of recoverable copper. "Development and exploration work," Mr. Wardlaw states, "was carried on throughout the year on various levels, particularly to explore the westerly extension of the Rio Tinto ore horizon. No new ore bodies have been discovered. Aside from further extensions to known ore bodies by stope development, no major item of importance was discovered in the exploration work. Ore reserves were decreased from the previous year by approximately 89,000 tons."

### IDAHO

»» Polaris Mining Company has reentered the list of dividend paying mines of the Coeur d'Alene district with a dividend of \$200,000, or 10 cents a share, payable April 15. This is the first dividend paid since

June 26, 1942, and brings the total dividend record to \$540,000. Resumption of dividend payments is made possible by Polaris participation in profits from the recently discovered Chester vein ore body which Sunshine and Polaris are operating on a 50-50 basis. Polaris' half interest in this operation netted the company over \$500,000 in the six months ending February 1.

Polaris Company's annual report for the year 1943 accounts for operations in "No Man's Land" territory in a 20-acre block of ground between the Polaris and Sunshine. The company is also milling 300 tons daily of river tailings.

» » The newly discovered deep leadzinc ore body at the Federal Mining & Smelting Company's Page mine west of Kellogg has been developed for a length of over 350 ft. and shows an average width of from 6 to 8 ft. Values average 15 percent lead, 10 percent zinc and 15 ounces in silver.

At its Morning mine at Mullan the Federal Company has just completed milling approximately 40,000 tons of mine dump ore from its No. 5 dump and 50,000 tons from the No. 6 dump. The material is low grade stuff but it serves the purpose of keeping the mill in operation during the current manpower shortage when labor cannot be had for production from the mine. The company has several other large dumps high up on Chloride Mountain which it is planned to mill as soon as snow conditions permit access to them.

» » Stanly A. Easton, president of the Bunker Hill M. & C. Company, announces in the annual report for 1943 that the company's ore reserves at the end of the year totaled 2,874,771 tons as compared with 2,839,-620 tons at the end of 1942. In spite of the manpower shortage during 1943 the company made a net profit of \$1,-307,635, equal to 98 cents a share on common stock after preferred dividends, as compared with 96 cents in 1942.

The company's hoisting machinery has reached its capacity at the 2,300 level and new electric hoisting equipment is now being installed at a cost \$561,000, and will be in operation in 1944, at which time it is presumed sinking operations will continue.

### OREGON

» » » The Chemical Construction Company of New York has the engineering contract for the new plant of the Columbia Metal Corporation \$4-million alumina from clay proces-

sing plant at Salem, Oreg. Preparation of the 82-acre site is in progress and construction of major buildings is expected to be started by mid-summer.

### CALIFORNIA

» » » As recently announced, Governor Earl Warren has appointed the following new members to compose the State Mining Board: Philip R. Bradley, Jr., of Pacific Mining Company, Jamestown, Tuolumne County; F. C. Van Deinse, San Francisco, president of Gold Producers of California and general manager, Yuba Consolidated Gold Fields; William C. Browning, Los Angeles, manager of Golden Queen Mining Company, Mojave, Kern County; William Wallace Mein, Jr., San Francisco, of Calaveras Cement Company, San Andreas, Calaveras County; and George W. Hallock, Grass Valley, Nevada County, president of California Hydraulic Mining Association.

### **BOOK REVIEWS**

AMERICAN MINING LAW by A. H. Ricketts; 1,018 pages. Bulletin No. 123, California State Division of Mines, 1943.

This is the fourth edition of this most excellent book on American Mining Law. The widespread use of and a continued demand for such an accurate, authentic treatise on the laws and court decisions relating to mines in the United States has exhausted the printer's supply of Bulletin 98 of the California Division of Mines, issued in 1931 under the same title. In the present edition (Bulletin 123) the full text on American Mining Law was revised, and a more detailed index with cross references was prepared by Mr. Ricketts shortly before his passing on November 27, 1938, at the age of 89 years.

Within the pages of this book are to be found numerous legal definitions of mining terms as well as a number of oil mining terms and phrases. The appendix on forms and precedents carries 79 of these useful aids to conduct and procedure in American mining litigation. The index is sectionalized for ready reference. The new volume is even more readable than the 1931 edition, being in larger print and making use of bold face lettering for headings. It should be well received in its new form by all members of the American mining industry.

RNAL

### Manufactutets Fotum

### Fifth Link-Belt Plant Receives the Army-Navy "E" Award



Employes and their families heard how their organization has contributed to the needs of armament for the armed services

On March 30, the San Francisco plant of Link-Belt Company, Pacific Division, was awarded the Army-Navy "E" for excellence in production of vital war matèriel, the fifth Link-Belt plant thus honored.

Capt. Joseph W. Fowler, U. S. N., assistant industrial manager of the Mare Island Navy Yard, made the presentation of award. Lt. Col. Frank E. Batson read the Army-Navy citation for meritorious and distinguished service to the United States of America on the part of the employes.

Paul N. Chenoweth officially accepted the Army-Navy "E" pins for the employes. Paul has not lost an hour's working time since Pearl Harbor. His only son, Lt. Robert Chenoweth, a P-38 fighter pilot, was lost in combat during the opening drive on the invasion of Africa.

Robert B. Gaylord, a director of the Pacific Coast organization, served as chairman. Ralph M. Hoffman, president, introduced Horace P. Phillips, vice president, who accepted the award flag on behalf of the company and its workers.

Mr. Phillips said: "It is indeed an honor to accept this pennant on behalf of the men and women of the Link-Belt Company. The machinery we have made has gone into many sections of the battle front. Through conveyors for aluminum and magne-

sium plants, and for the assembly lines of airplane factories, we have had a part in putting our tremendous fleet of planes into the air. Our equipment for hi-octane gas producing plants has helped to get them there and to keep them flying.

"Whether working at the desk or drawing board, typewriter or calculating machine, at the machine tool, or at punch, shear, or welder, all of us have had a part in doing this work and in winning this award—the highest our Government can give industry. But our work is not yet done, and I pledge to these officers of the Army and Navy that our efforts will continue, so that each six months will find a new star on this pennant, which we prize so highly."

Other Link-Belt plants winning the "E" award, are: Link-Belt Ordnance Co., Chicago, June 14, 1943; Link-Belt Company Ewart plant, Indianapolis, June 17; Link-Belt Company Pershing Road plant, Chicago.

### New Coated Aluminum-Bronze Electrode

The Wilson Welder and Metals Co., Union City, N. J., announces a new coated aluminum-bronze electrode— Wilson No. 200. This coated high tensile bronze electrode is a shielded arc electrode, and can also be used as

a filler rod in carbon arc welding. It will produce welding deposits of great strength and hot ductility, combined with desirable resistance to corrosion.

It can also be used for welding dissimilar metals, such as cast iron to brass, steel to malleable iron, or the joining of any two metals which are weldable with aluminum-bronze.

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Sizes from ½ in. to ¾6 in. in 14-in. length and ¼ in. in 18-in. length are standard stock items. Sizes from ¾6 in. to ½ in. in 18-in. lengths may be procured on special order, available through the Wilson Welder and Metals Co. and authorized distributors.

### New Officers for Independent Pneumatic Tool

Neil C. Hurley was recently elected chairman of the directors of the Independent Pneumatic Tool Company and Neil C. Hurley, Jr., was elected president.

The younger Mr. Hurley has been

associated with the firm for 12 years, following his graduation from Notre Dame. In recent years following his managership of the company's electric tool division. he has successively served as secretary, vice president and



Neil C. Hurley, Jr.

executive vice president.
Edward G. Gustafson, treasurer of
the company, and John McGuire, secretary, were elected to the Board of
Directors.

### Rivnut Available to Industry

The patented Rivnut of the B. F. Goodrich Company is now available for a wide variety of industrial applications.

The Rivnut is an internally threaded and counterbored tubular rivet which can be headed blind, made from one of the most corrosive-resistant practical aluminum alloys. Of one-piece construction, the Rivnut is anodized and ready for use when received.

By the use of special tools, either manually or power operated, the Rivnut can be pulled up or headed while working entirely from one side, forming a bulge or head on the far

side. This upset is large enough to resist being pulled through the metal.

Installed, the Rivnut serves as a nut plate or rivet, or both.

### Exide Awarded Fourth Army-Navy "E"

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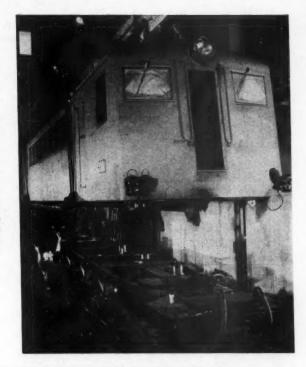
IRNAL

The Electric Storage Battery Company has been notified that they have been awarded another star—the fourth—for their Army-Navy "E" pennant.

This award, which is really their fifth citation for continued excellence of production, places Exide in the unique category of those few manufacturing concerns in the United States that have received this signal honor.

The rarity of the award may be fully appreciated when it is realized that of the more than 100,000 plants in the country making war materials, actually less than 100 have won a fourth star in addition to their original "E" award.

Six electric motors supply nearly 2,000 horsepower for this locomotive now being assembled by Westinghouse for service in the rich ore regions of Sao Paulo, Brazil. It is one of 10 being built by Westinghouse each 61 feet long and capable of hauling 12 loaded cars



### **New Offices for Climax in Detroit**

The Climax Molybdenum Company announces the opening of offices at 624 Fisher Building, Detroit, Mich., on April 1, to handle the company's sales and service work in Michigan, Indiana and the Toledo district.

V. A. Crosby, for the past 10 years as metallurgical engineer and sales representative, will be in charge of the office.

The company's research work will continue at the laboratory of the Climax Molybdenum Company of Michigan, in Detroit, under the direction of A. J. Herzig, vice president and chief metallurgist.

### Manhattan Rubber's Victory Gardens Already Under Way

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The 400 garden project that won the highest award of the National Victory Garden Institute, is now under way for the 1944 season, it is announced by officials of the Manhattan Rubber Mfg. Division of Raybestos-Manhattan, Inc., Passaic, N. J.

Chairman of the victory garden committee, James J. De Mario, advertising manager of Manhattan, says that gardeners are already at work, clearing away old vegetable waste and preparing for fertilizing. In view of the expected food shortage, it is expected that the gardeners will endeavor to better their fine record of last year.

### 59 Macwhyle Service Awards

A gala occasion for employes of the Macwhyte Company and their families marked the company's traditional "progress party" at the Kenosha, Wis., Eagles' Club Saturday, April 15.

Rewards of recognition for the service records of 59 employes were presented, including 15 who were given gold watches upon reaching 25 years of continuous employment with the company. There were other awards to those with 5, 10, 15 and 20 years of service.

Preceding the meeting there were the traditional opening ceremonies. The colors were posted by Color Bearer John Beckman and Guards Wm. Blise and George Manupella, followed with "Call to the Colors" by George Manupella, with Otto Zank, president of the Macwhyte Ex-Service Men's Club, leading "The pledge of allegiance" and Dick Roman leading the singing of "God Bless America."

More than 1,200 employes, officers and stockholders, and their families took part in the evening's festivities.

### Atlas District Offices to New York

The Philadelphia District sales offices of the Explosives Department of Atlas Powder Company are being moved to New York City May 22, 1944, according to an announcement by R. K. Gottshall, director of sales. The new offices will be located in the Empire State Building, 350 Fifth

Avenue. Explosives sales offices formerly at 60 E. 42nd Street, New York, are being moved to the new location. A sales office is being maintained at the old address in Philadelphia.

W. C. Manning, assistant director of sales of the Explosives Department, is transferred from the general offices of Atlas, at Wilmington, Del., to take charge of the new offices, succeeding E. W. Moorehouse, who will retire July 1 after 44 years with the explosives industry.

### New Plant for U. S. Rubber

Formal announcement of the occupancy of plant No. 1 of the original Lowell Ordnance Works, at Lowell, Mass., by the wire and cable department, United States Rubber Company, was made recently by C. W. Higbee, manager of that department.

Present plans call for the installation of machinery and other necessary equipment in approximately one-half million sq. ft. of space as soon as the Ordnance Department completes removal of ammunition manufacturing equipment.

The plant will employ approximately 1,500 persons and will confine its manufacture to long line communications cable for the United States Signal Corps.

Present plans call for the training of future employes at the Bristol plant of United States Rubber Company after which they will work in the Lowell plant.

MAY, 1944

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MINING CONGRESS JOURNAL



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TRU-LAY saves time by reducing the number of shut-downs for replacement. That's because it lasts longer.

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It saves time because it's safer. Broken crown wires in TRU-LAY lie flat. They don't wicker out to jab hands and cause infection.

All these and many other advantages of TRU-LAY come from its being perfectly preformed.

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"U. S." War Type Mining Machine and Locomotive Cables—made to specifications as directed by the War Production Board. Back of these cables are the same company, the same technical experience and the same manufacturing science and skill that made U. S. Royal Mining and Locomotive Cables so tough, dependable and long-lived.



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